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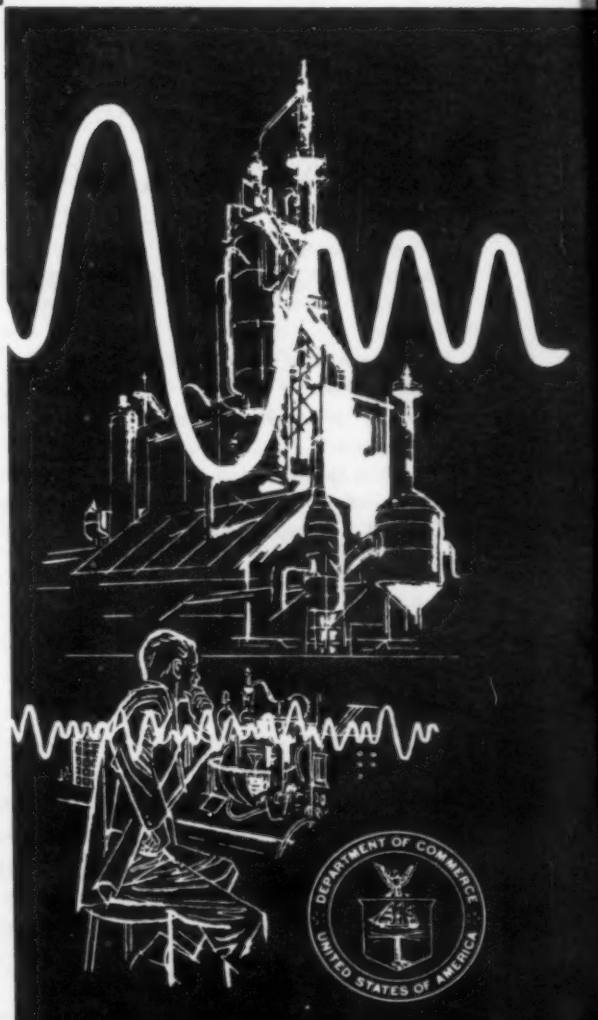

U. S. DEPARTMENT OF COMMERCE

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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

OFFICE OF TECHNICAL SERVICES
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STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS - REPORT NO. 19.
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AD-416 363 DIV. 14

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AERODYNAMIC CONFIGURATIONS
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AD-416 386 DIV. 8

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AD-415 851 DIV. 8

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AD-416 437 DIV. 8

WEAPON SYSTEMS
GUIDED MISSILES(SURFACE-TO-SURFACE)
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ANALYSIS
A PLAN FOR THE TEST AND EVALUATION OF TERMINAL FORECASTING TECHNIQUES (2-24 HOUR FORECAST LENGTHS).
AD-416 305 DIV. 3

WEATHER FORECASTING
TROPICAL REGIONS
ASPECTS OF THE METEOROLOGY OF THE TROPICAL PACIFIC.
AD-415 838 DIV. 3

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AD-416 163 DIV. 9

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POPULAR DISCUSSION OF WEIGHTLESS-NESS EFFECTS NOTED BY RUSSIAN ASTRO-NAUTS DURING SATELLITE FLIGHTS.
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WELDING
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AD-415 653 DIV. 24

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ELECTRON TRANSITIONS
SCATTERING OF ENERGETIC TRAPPED ELECTRONS BY VERY LOW FREQUENCY WAVES.
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AD-416 246 DIV. 9

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STRENGTH AND RELATED PROPERTIES OF MOUNTAIN HEMLOCK.
AD-416 435 DIV. 14

WOUNDS & INJURIES
HEALING
A CLINICAL AND HISTOLOGICAL COM-PARISON OF WOUND HEALING FOLLOWING TWO TYPES OF MUCOGINGIVAL SURGERY ON RHESUS MONKEY.
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X-RAY DIFFRACTION ANALYSIS
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X-RAY STUDIES OF ORGANIC MOLECULES GENERALLY IN THE IONIC FORM AND DILUTED STRUCTURALLY BY COMPLEX IONS WHICH DOMINATE THE PACKING OF THE STRUCTURES.
AD-415 891 DIV. 25

X-RAY PHOTOGRAPHY
CRYSTAL STRUCTURE
MOLECULAR STRUCTURES OF ORGANIC SUBSTANCES OF UNUSUAL GEOMETRY OR ELECTRONIC STRUCTURE BY X-RAY CRYSTAL-LOGRAPHIC METHODS. USE OF COMPUTERS FOR STRUCTURE DETERMINATION. TECHNICAL REPORTS AND PUBLICATIONS.
AD-416 362 DIV. 8

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-415 618 Div. 1, 30
(TISTA/VGW) OTS price $3.50

Midwest Research Inst., Kansas City, Mo.
AUTOMATIC RUNWAY PROFILE MEASURING INSTRUMENTATION AND RUNWAY PROPERTIES. PART III. BASE SURVEYS.
Final rept., Feb 61-Dec 62,
by D. F. Turner. July 63, 215p.
Contract AF33 616 7851, Proj. 1367, Task 136701
WADD TR60 470, pt. 3 Unclassified report

Report on Structural Design Criteria.

Descriptors: (*Runways, Surface properties), Instrumentation, Engineering, Collimators, Mobile, Data processing systems, Data storage systems, Analog systems, Test methods, Statistical analysis, Tables, Air force research.

Runway roughness data from surveys of runways, taxiways, and selected parking ramps of 17 Air Force bases in the United States of America are presented in the form of profile and power spectral density plots. Tabulated data and base maps are included to describe the length of the surveys and their location. The method used to calculate the power spectral density is enclosed. (Author)

AD-415 677 Div. 1, 27, 7
(TISTE/CAM) OTS price $4.60

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEMS OF ELECTRICAL AUTOMATIC DEVICES AND ELECTRICAL EQUIPMENT OF AIRCRAFT (SELECTED ARTICLES).
4 Apr 63, 47p.
FTD TT63 145 Unclassified report

Trans. from Voprosy Elektroavtomatiki i Elektrooborudovaniya Samoleta, Gosydarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo, Moscow, pp. 60-77, 78-98, 1962.

Descriptors: (*Electrical equipment, Aircraft), (*Ignition systems, Ignition circuits), Automatic, Wiring diagrams, Circuits, Theory, Electric current, Electric fields.

AD-415 924 Div. 1, 6, 28
(TISTA/VGW) OTS price $2.60

Applied Psychology Corp., Arlington, Va.
CONSPICUITY OF SELECTED SIGNAL LIGHTS AGAINST CITY-LIGHT BACKGROUNDS.
June 62, 15p. Technical rept. no. 13
Contract FAA BRD127, Proj. 110 512R
Unclassified report

Descriptors: (*Signal lights, Detection), (*Navigational lights, Detection), Urban areas, Light, Night flight, Aviation safety, Brightness, Background, Model tests, Visual signals, Visibility.

Detections of a small signal light against city-light backgrounds were made by experienced pilots during 288 presentations to determine whether detection time was affected by variations in signal characteristics and background, and whether pilot differences occurred. The experiment yielded evidence that: (1) A red signal light was moderately more detectable than a green one, and the green moderately more so than a white light. (2) Some city backgrounds provided far more difficulty for detection of a flashing signal than others, the primary characteristics of difficult backgrounds apparently being high intensity, concentration of many lights, presence of one or more flashing lights, and wide variety of color. (3) Relative detectabilities among signal colors remained the same regardless of the predominant background color against which they were viewed. (4) A dot-dash flash pattern was significantly more detectable for some subjects and a series of dots more detectable for others. (5) Subjects did not differ significantly in detection time, in spite of using different search patterns. (Author)

AD-415 949 Div. 1, 30
(TISTE/CAM) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
TEST AND EVALUATION OF A PILOT WARNING INDICATOR,
by J. J. Adler. Jan 63, 22p.
Proj. 719
NAVWEPS Rept. 8080 NOTS TP 3102
Unclassified report

Descriptors: (*Indicator lights, Warning systems), (*Warning systems, Aircraft), Infrared receivers, Infrared transmitters, Wiring diagrams, Performance tests, Flight testing, Calibration, Flight instruments.

A pilot warning indicator built by the Minneapolis-Honeywell Regulator Company has been evaluated by the Naval Ordnance Test Station. Ground and in-flight measurements of the system's performance were obtained. Test results and recommendations for improvement of the equipment are presented. (Author)

AD-416 002 Div. 1, 9
(TISTA/GEC) OTS price $5.60

Aerospace Industries Association of America, Inc., Washington, D. C.
PANEL FLUTTER SURVEY AND DESIGN CRITERIA,
by L. I. Mirowitz, N. H. Zimmerman and J. W. Schweiker. 7 Aug 62, 49p. ATC Rept. no. ARTC32
Unclassified report

Descriptors: (*Aircraft panels, Flutter), Vibration, Fatigue (Mechanics), Swept-back wings, Aspect ratio, Model tests, Wind tunnel models, Aerodynamic characteristics, Flight testing.

The assignment of gathering data on in-flight incidences of panel flutter was undertaken for the purpose of improving the state-of-the-art. The following report presents the results of this

survey including the data compilation, reduction, presentation, tentative suggested criteria, present state-of-the-art evaluation and suggestions for additional panel flutter research required to satisfy current and future industry needs. (Author)

AD-416 230 Div. 1, 9
(TISTA/FRL) OTS price $5.60

Walker, Norman K., Associates, Inc., Bethesda, Md.
AN ANALYSIS OF THE RESULTS OF WIND TUNNEL TESTS ON A CIRCULAR MODEL GROUND EFFECT MACHINE,
by Norman K. Walker and Robert J. Neal.
June 63, 1v. AERO Rept. no. 954; 6
Contract Nonr341200
Unclassified report

Descriptors: (*Ground effect machine, Model tests), Wind tunnel models, Analysis, Lift, Drag, Pitch (Motion), Velocity, Pressure.

Analysis is presented of the results of wind tunnel tests on a circular model ground effect machine. Lift, drag and pitching moment were measured on a model GEM, 6 inches in diameter with a very thin annular jet, at wind speeds ranging from 65 to 185 feet per second and jet pressure ratios (P/P sub t) ranging from 0.9 to 0.3. Models were held at zero incidence to the ground board and the height above the ground board was varied over a wide range. The report presented values of the lift coefficient (C sub L) plotted against the jet momentum coefficient (C sub micron) with the drag coefficient (C sub D) and pitching moment coefficient plotted against C sub L. In this form the significance of the data is not readily apparent and so, in this analysis, it is preferred to replot the data in the forms suggested. The meaning of the results is then much more easily adduced. (Author)

AD-416 353 Div. 1, 6, 30
(TISTA/VGW) OTS price $4.60

Oklahoma State U., Stillwater.
DEVELOPMENT OF A METHOD OF MEASURING TURBINE WHEEL TEMPERATURES IN JET AIRCRAFT USING AN INFRARED PYROMETER,
by Paul William Montgomery. May 63, 39p.
Unclassified report

Master's thesis.

Descriptors: (*Turbojet engines, Turbine wheels), (*Turbine wheels, Temperature warning systems), Jet bombers, Pyrometers, Thermal stresses, Failure (Mechanics), Design, Tests.

The adaptation of an infrared pyrometer is investigated in the development of a method of measuring turbine wheel temperatures in the J-47 turbojet engine. This report deals exclusively with the J-47 engine as used on the B-47 aircraft. However, it is intended that this investigation may also provide a basis for installation in other aircraft in which a means of monitoring turbine wheel temperatures is desired. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-415 751 Div. 2, 6
(TISTM/AMS) OTS price $8.60

Texas A and M Coll., College Station.
THEORETICAL INVESTIGATION OF THE APPLICABILITY OF A DUAL-FREQUENCY RADAR SYSTEM TO THE STUDY OF CONVECTIVE LIQUID PRECIPITATION,
by Vernon M. H. Von. May 63, 87p.
Unclassified report

Master's thesis.

Descriptors: (*Atmospheric precipitation, Meteorological radar), (*Meteorological radar, Atmospheric precipitation), Equations, Drops, Particle size, Distribution, Raindrops, Frequency, Atmospheric refraction, Clouds, Convection, Rainfall, Meteorological instruments, Radar signals.

Two radars of 10.3-cm (WSR/TAM-1) and 3.2-cm (AN/CPS-9) wave length were combined to form a dual-frequency system. The applicability of this system to the study of convective liquid precipitation is investigated. (Author)

AD-415 752 Div. 2
(TISTP/FEM) OTS price $31.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMIC RAY VARIATIONS (Variatsii Kosmicheskikh Luchey),
by L. I. Dorman. 1957, 726p.
FTD Trans. no. FTS9379 Unclassified report

Trans. from State Publishing House for Technical and Theoretical Literature, Moscow, 1957.

Descriptors: (*Cosmic rays, Periodic variations), (*Cosmic ray bursts, Theory), Intensity, Geophysics, Astrophysics, Correlation techniques, Solar atmosphere, Electromagnetism, Upper atmosphere, Exosphere, Meteorological phenomena.

The experimental and theoretical methods of investigating the variations of cosmic rays (time variations of their intensity) are presented. Systematized analysis of the accumulated experimental material, and consideration of the hypotheses that have been proposed for the origin of various types of variations are presented. A theory is proposed for the origin of the variations, and their correlation with various geophysical and astrophysical phenomena is examined, in particular their correlation with the properties of the solar corpuscular streams and with the electromagnetic conditions in the neighborhood of the earth, in the solar atmosphere, in interplanetary space, and in the Galaxy. (Author)

AD-415 802 Div. 2, 15
(TISTM/AM) OTS price $7.60

Ohio State U., Columbus.
THE EFFECT OF COMBINED TRIANGULATION AND

TRILATERATION OBSERVATIONS IN THE ADJUSTMENT OF A SMALL NETWORK,
by Sterling Doug Goode. 1963, 73p.
Unclassified report

Master's thesis.

Descriptors: (*Surveying, Programming (Computer), Taylor's series, Trigonmetry, Mathematical analysis, Tables, Errors, Theodolites.

AD-415 811 Div. 2
(TISTP/FR) OTS price $8.60

Texas A. and M. Coll., College Station.
AN INVESTIGATION OF TIME CHANGES IN CLOUDS OBSERVED OVER THE GULF OF MEXICO AND CARIBBEAN SEA DURING THE PERIOD 18-23 JULY 1961,
by William Paul Cramer. May 63, 82p.
Unclassified report

Master's thesis.

Descriptors: (*Clouds, Aerial photography), Aerial photography, Meteorological satellites, Meteorological charts, Meteorological parameters, Air mass analysis.

A radical change in cloud cover occurred over the Gulf of Mexico between 18 and 20 July 1961. This development occurred when an easterly wave moved westward across the Caribbean Sea into the Gulf and combined with an upper trough of polar origin moving eastward through the lower United States. The superposition of these systems resulted in deepening of the combined system and development of an extensive cloud mass. The cloud mass gradually changed orientation and then dissipated as the forming mechanism disappeared. Analyses using conventional data and meteorological satellite data from TIROS III were used to identify and follow the above systems. Isopleths of relative humidity were used to identify moist air on constant pressure charts. Regions described as ''dry'' by the relative humidity analysis, especially at 700 and 500 mb, had insignificant cloud amounts. When the ''dry'' area included the 850 mb level, the TIROS pictures always indicated fair weather skies. Large values of relative humidity were not always a reliable indication of cloud cover. (Author)

AD-415 813 Div. 2
(TISTP/MFA) OTS price $4.60

Ohio State U., Columbus.
EFFICIENCY OF METHODS OF PRODUCING ICE CRYSTALS IN SUPERCOOLED CLOUDS,
by Leonard Neal Starr. June 63, 35p.
Unclassified report

Master's thesis.

Descriptors: (*Clouds, Supercooling), (*Crystals, Ice fog), Crystal growth, Crystal structure, Silver compounds, Iodides, Simulation, Microscopy, Rockets, Crystallization, Nucleation, Warheads, Mortars, Meteorology.

Simulated rockets and a system of collection plates were constructed for use in supercooled fog in an attempt to determine the efficiency of liquid nitrogen and silver iodide in producing ice crystals. An experiment comparing the efficiency of ice nuclei formation of a silver iodide ''warhead'' and silver iodide impregnated gunpowder string was also conducted using an ice nuclei counter. Liquid nitrogen is capable of producing ice crystals as long as the temperature of the cloud is below 0 C. The threshold temperature of silver iodide for converting supercooled droplets to ice crystals is -5 C. Supercooled fog with the required -5 C temperature was not encountered during the experiments so that ice crystal data for the silver iodide warhead could not be collected. The number of ice nuclei produced with the silver iodide warhead was significantly greater than the same quantity of silver iodide impregnated gunpowder string when ignited. Liquid nitrogen was effective in producing ice crystals, but considering cost and handling problems, the efficiency is reduced. (Author)

AD-415 820 Div. 2
(TISTM/AMS) OTS price $6.60

Texas A and M Coll., College Station.
TOPOSCALE ANALYSES OF THE TEMPORAL VARIATIONS IN THE VERTICAL DISTRIBUTION OF MOIST-TERM REFRACTIVITY,
by August L. Shumbera, Jr. May 63, 58p.
Unclassified report

Master's thesis.

Descriptors: (*Refractive index, Meterology), (*Meteorology, Refractive index), Moisture, Wind, Temperature, Rainfall, Troposphere, Air mass analysis, Distribution, Atmospheric refraction, Analysis.

Data collected during August 1959 from a 32-m topometeorological tower located in a semiarid region in Southeast Washington were used to investigate 15-min vertical distributions of moist-term refractivity. Three case studies, each covering a 24-hr period, were made for different conditions. The temporal distribution of maximum and minimum values of moist-term refractivity was correlated with wind velocity, temperature changes, and rain-shower occurrence. Minimum fluctuations in the gradients of moist-term and total refractivity occurred during periods in which a local drainage wind was present. Maximum variations were experienced during rain-shower activity. Changes in the moist-term and total refractivity for the 32-m layer were as large as 52 and 61 units per 1000 ft in a 30-min period, respectively. (Author)

AD-415 823 Div. 2
(TISTP/FR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
ON THE ATTENUATION OF SOLAR RADIATION IN THE UPPER LAYERS OF THE TROPOSPHERE.
20 May 63, 5p.
AID T63 75 Unclassified report

Descriptors: (*Solar radiation, Attenuation), Attenuation, Aerosols, Troposphere.

The aerosol attenuation coefficient of direct radiation at an altitude of 3-5 km is practically equal to zero. At the same time, the aerosol optical thickness of the atmosphere above 6 km attains a considerable magnitude. Experimental values are given and their dependence on wavelength and atmospheric conditions is discussed. (Author)

AD-415 838 Div. 2
(TISTP/FR) OTS price $4.60

Hawaii Inst. of Geophysics, Honolulu.
RESEARCH ON THE METEOROLOGY OF THE TROPICAL PACIFIC AND ITS APPLICATIONS.

Final rept., 15 Mar 60-31 Mar 63,
by Ronald L. Lavoie. June 63, 42p. Rept. no. 37
Contract AF19 604 7229, Proj. 8641, Task 864115
AFCRL Rept. no. 63 803 Unclassified report

Descriptors: (*Weather forecasting, Tropical regions), Tropical regions, Tropical cyclones, Motion, Wind, Equations, Stratosphere, Climatology.

Contents: The Problem of Defining and Predicting Typhoon Formation; The Development of Regression Equations to Predict Typhoon Movement and Intensity Changes; Upper-Level Wind Forecasting by Statistical Techniques; The Climatology of the Field of Motion in the Troposphere and of the Field of Temperature in the Stratosphere over the Tropical Pacific; The Evaluation of the 'Island Influence' of an Atoll; The Description and Explanation of Diurnal Variations of Low Clouds and Showers over the Sea; The Information to be Gained in a Climatological Treatment of Wind-Weather Relationships in the Central Pacific.

AD-415 961 Div. 2
(TISTM/EJH) OTS price $1.10

Columbia U., New York.
(No title)
Final rept., 1 May 62-30 Apr 63.
30 Apr 63, 4p.
Grant AF AFOSR62 50
AFOSR 5228 Unclassified report

Descriptors: (*Microwave spectroscopy, Solar radiation), (*Solar radiation, Microwave spectroscopy), (*Radio astronomy, Solar radiation), Absorption spectra, Atmosphere, Nitrogen, Oxygen, Solar corona, Hyperfine structure.

A radiotelescope designed to operate in the M-band frequency region (50 kmc - 75 kmc) was constructed on the roof of the Columbia University Physics Building in 1959. This radiotelescope, with its 5-foot parabolic antenna, was used to study atmospheric absorption lines which are members of the O(2) spin reorientation spectrum and which are abundant near 60 kmc. It was also used to study the emission line near 53 kmc produced by the hyperfine splitting of hydrogenic nitrogen ions in the solar corona. (Author)

AD-415 962 Div. 2
(TISTP/AMS) OTS price $7.60

Allied Research Associates Inc., Concord, Mass.
FLEET APPLICATIONS -- METEOROLOGICAL OPERATIONAL SATELLITES (ANTARCTIC AREA).
Final rept.,
by Earl S. Merritt. 15 Aug 63, 66p. ARA F9228 2
Contract N189 188 56507A
NWRF 33 0863 077 Unclassified report

Original contains color plates: all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Meteorological satellites, Meteorological parameters), Satellites (Artificial), Meteorological charts, Climatology, Cyclones, Troposphere, Clouds, Ice, Snow, Wind, Jet streams (Meteorology), Experimental data, Weather forecasting, Fleets.

Studies of meteorological satellite observations in the southern hemisphere, for the period July 1 - Oct 31, 1962, have led to the development of techniques for extracting operationally useful meteorological information from satellite-observed cloud patterns. These techniques are designed to provide useful data on the following: (a) Field of motion of the lower and upper troposphere. (b) Cyclonic vortex intensity, development and direction of future motion. (c) Differentiation of cloud from snow and snow-covered ice. The techniques reported here were specifically developed to provide meteorological information for support of the Antarctic re-supply operations. However, further tests and evaluation may indicate that many of these techniques are applicable to other geographical areas. (Author)

AD-416 049 Div. 2
(TISTP/FR) OTS price $5.60

Oklahoma U. Research Inst., Norman.
DENSITY IN HYDROSTATIC ATMOSPHERES,
by Victor S. Whitehead and Edward F. Blick.
June 63, 41p. Scientific rept. no. 1
Contract AF19 628 489, Proj. 8624, Task 862402
AFCRL 63 683 Unclassified report

Descriptors: (*Atmosphere, Density), Density, Barometric pressure, Temperature, Wind.

A theoretical and numerical analysis was made of factors determining the height of the level of constant atmospheric density (isopycnic level) above any base. The physical relationship between this level and the level of maximum percent departure from standard of density is given. While the atmospheres considered in the numerical analysis approximate the Earth's troposphere, the resulting figures, if used in conjunction with the developed theory, may be considered indicative of the behavior of hydrostatic atmospheres in general. (Author)

AD-416 149 Div. 2
(TISTP/FR) OTS price $1.60

Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Quarterly technical rept. no. 7, 1 Apr-30 June 63,
by E. A. Mueller, G. E. Stout and William C. Ackermann. 1 July 63, 10p.
Contract DA36 039SC87280, Task 3A99 07 001 01
Unclassified report

Descriptors: (*Meteorological radar, Raindrops), Raindrops, Photographic analysis, Cameras, Evaporation.

Three raindrop cameras were operated on the East Central Illinois Raingage Network. Because of drought conditions only 38 rolls of raindrop camera film were obtained. A portion of these data was edited to determine if the data were appropriate for detailed analysis. Processing of the raindrop camera data has been continuing in a routine manner. Sixteen rolls of raindrop camera data were measured and preliminary calculations performed. Since the original objective of this contract was to determine measuring techniques for radar measurement of rainfall, the correlation between the rainfall rate and the radar reflectivity has been re-examined, utilizing the assumption that the measurement of Z was quite accurate. Because of the change in the computer facilities in the University and the requirements of a smaller Z increment, the program for obtaining the best estimate of rainfall

rate given a particular radar reflectivity has been rewritten for the 7090 computer. This program has not been checked as yet. Work has been continuing on the estimation of the evaporation effect on raindrop size distributions, and a short synposis of the findings and sample effects on drop size distributions are presented. (Author)

AD-416 157 Div. 2
(TISTP/FR) OTS price $9.60

Aerojet-General Corp., Azusa, Calif.
ROCKETS IN SPACE ENVIRONMENT, VOLUME II. THE SPACE ENVIRONMENT.
Final rept.,
by N. A. Williams and D. Christensen. Feb 63, 1v.
Rept. no. 2484
Contract AF04 611 7441, Projs. 3058 03 and 6753 01
RTD TDR63 1050 Unclassified report

Descriptors: (*Space environmental conditions, Handbooks), Van Allen radiation belt, Protons, Electrons, Solar flares, Cosmic rays, Infrared radiation, Ultraviolet radiation, Exosphere, Meteors.

Environmental factors constituting the space environment between 300 and 22,000 n.mi. altitude are discussed and defined. These factors are ionizing particle radiation (including Van Allen, solar flare, and primary cosmic radiation), electromagnetic radiation (from both earth and sun), temperature and pressure in the exosphere, and meteoroids (both asteroidal and cometary). (Author)

AD-416 211 Div. 2
(TISTP/FR) OTS price $8.60

Johannes Gutenberg-Universitaet, (Germany).
OPTICAL TRANSMISSION OF THE ATMOSPHERE IN GREENLAND II. (SKY RADIATION, DEGREE OF POLARIZATION AND TWILIGHT INTENSITY).
Final technical rept., 1 June 62-30 June 63,
by K. Bullrich, B. Braun, R. Eiden and W. Nowak. 30 June 63, 1v.
Contract DA91 591EUC2310
Unclassified report

Descriptors: (*Sky brightness, Measurement), Light, Measurement, Troposphere, Aerosols, Scattering, Particles, Polarization, Twilight.

Information about sky radiation and the optical property of the Greenland atmosphere was gathered. In order to investigate the stratification of atmospheric haze in the higher atmosphere, some twilight measurements were made. Spatial distribution of intensity and the degree of polarization in various narrow spectral ranges and twilight intensity in various narrow spectral ranges was measured near Camp Century in North Greenland. The observations were made at a distance of 850 meters east of Camp Century, which is situated 77 degrees 11 minutes North and 60 degrees 09 minutes West, about 2000 meters above sea level. (Author)

AD-416 226 Div. 2
(TISTP/FR) OTS price $8.60

Marine Lab., U. of Miami, Coral Gables, Fla.
THE HURRICANES OF THE CARIBBEAN SEA AND ADJACENT REGIONS DURING THE SIXTEENTH CENTURY.
Preliminary rept., 1 July 62-30 Jun 63,
by Jose Carlos Millas. June 63, 90p. Rept. no 8242 1; ML63377
Contract Cwb10467
Unclassified report

Descriptors: (*Tropical cyclones, Histroy), Tropical regions.

AD-416 227 Div. 2
(TISTP/FR) OTS price $6.60

Marine Lab., U. of Miami, Coral Gables, Fla.
THE HURRICANES OF THE CARIBBEAN SEA AND ADJACENT REGIONS AT THE END OF THE FIFTEENTH CENTURY.
Preliminary rept., 15 Oct 61-30 June 62,
by Jose Carlos Millas. June 62, 65p. Rept. no. 8212 1; ML62228
Contract Cwb10279
Unclassified report

Descriptors: (*Tropical cyclones, History), Tropical regions.

AD-416 239 Div. 2
(TISTP/FR) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
PRECIPITATION OF ENERGETIC ELECTRONS INTO THE ATMOSPHERE,
by G. A. Paulikas and S. C. Freden. 21 Aug 63, 28p. Rept. no. TDR169 3260 20TN5
Contract AF04 695 169
SSD TDR63 204 Unclassified report

Descriptors: (*Electrons, Upper atmosphere), Upper atmosphere, Measurement, Instrumentation, Energy, Geography.

Measurements were made of electron fluxes and spectra above 900 kev at altitudes between 200 and 700 km in early September and October 1962 aboard two near polar Air Force satellites. The particle fluxes were observed with shielded solid state detectors having a 2 pi solid angle. The results show that electrons are lost from the radiation belts into the atmosphere along narrow ranges of L near L = 1.2 and L = 2 as well as in the L = 3 to 8 region. The L = 2 and L = 3 to 8 fluxes and spectra exhibit temporal variations. A typical precipitating flux at B = 0.35 gauss, L = 2.0 is 1000/sq cm sec with E>0.9 Mev. A typical integral energy spectrum for L = 2, B = 0.35 gauss is E to the -3rd power between 0.9 and 1.7 Mev. Comparison of results with pre-Starfish measurements indicates that the fluxes of electrons observed near L = 1.2 and L = 2 are not connected with the high altitude explosion of July 9, 1962. (Author)

AD-416 246 Div. 2
(TISTP/FR) OTS price $16.00

Kaman Nuclear, Colorado Springs, Colo.
TABLES OF REGRESSION COEFFICIENTS TO ESTIMATE ROUTE WINDS FOR THE AIR ROUTE FROM CHRISTCHURCH, NEW ZEALAND, TO MCMURDO, ANTARTICA.
Final rept., Sep-Nov 63.
Aug 63, 1v. KN681 63 1FR, V1
Contract N189 188 55443A
Unclassified report

Descriptors: (*Wind, Tables), Statistical analysis, Civil aviation.

The tables are for the purpose of computing estimates of the route winds on the air route

from Christchurch, New Zealand, to McMurdo, Antarctica. These estimates are based on wind and height data from two simultaneous radiosonde or rawinsonde observations in the neighborhood of the air route. (Author)

AD-416 293 Div. 2, 25
(TISTM/TLG) OTS price $2.60

Sacramento Peak Observatory, Sunspot, N. Mex.
THE MECHANISM OF SOLAR FLARES AND OF THE GENERATION OF COSMIC RAYS IN FLARES,
by A. B. Severny, V. P. Shabansky and trans. by Alice B. Dunn. 1961, 24p. Solar research note no. 40

Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs. XXV, pp. 88-113, 1961.

Descriptors: (*Solar flares, Theory), (*Cosmic rays, Theory), Magnetic pinch, Thermonuclear reactions, Plasma physics, Magnetic fields, Shock waves, Acceleration, Sunspots.

The contraction of plasma around a neutral point of a magnetic field may be connected with pinch-effect, arising at the approach of two force tubes and the annihilation of their azimuthal fields. The possibility of such contraction at a rapid change of the sunspot field is discussed, assuming that this field is of a dipole character. In both cases, the conception of strong shock waves converging at the neutral point is indicated. Near this point the incident shock wave is not hydromagnetic, and its front outruns the magnetic wall - the region of a strong field which moves together with the main mass of plasma behind the front. After reflection in the neutral plane, the front of the reflected shock moves in the contracting plasma and a more or less steady high-temperature plasma is formed behind this front. The high-temperature plasma obtains its energy from magnetic energy losses connected with the contraction of the plasma. The reflected shock may check or stop the contracting wall, so that expansion or pulsations can set in instead of contraction. (Author)

AD-416 295 Div. 2
(TISTP/FR) OTS price $3.60

Hawaii Inst. of Geophysics (Honolulu).
AIR-EARTH INTERFACE CHARACTERISTICS AND THE ATMOSPHERIC BOUNDARY LAYER,
by Mariano A. Estoque and Walter S. Yee.
July 63, 9p. Scientific rept. no. 3; Rept. no. 36
Contract AF19 604 7484, Proj. 7655, Task 765501
AFCRL 63 813 Unclassified report

Descriptors: (*Atmosphere, Boundary layer), Boundary layer, Earth, Surface properties, Albedo (Astronomy), Moisture, Temperature, Wind, Heat transfer.

The effects of various types of albedo and moisture conditions at the earth's surface on the soil and atmospheric boundary layers are studied theoretically by numerical integrations of a physical model. In order to investigate the effect of albedo, three different types were considered - a natural grass-covered flat surface, a black surface, and a white surface. For moisture, the three types used are the natural grass-covered surface, a wet surface, and a dry surface. The subsequent changes of the temperature, wind, and moisture fields under these various conditions in response to solar radiation using identical initial distributions are analyzed. (Author)

AD-416 296 Div. 2
(TISTP/FR) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
A REEXAMINATION OF LORD RAYLEIGH'S DATA ON THE AIRGLOW 5577 A(01) EMISSION.
Research rept.,
by G. J. Hernandez and S. M. Silverman. June 63, 27p.
Proj. 8627
AFCRL 63 835 Unclassified report

Descriptors: (*Sky brightness, Spectra (Visible and ultraviolet)), Spectra (Visible and ultraviolet), Line spectrum, Optical filters.

Rayleigh's published data on the airglow green line covering an entire sunspot cycle have been little used because of the manner of presentation. These data have been reexamined and the results for the different stations put on a common basis and converted to present-day units. The assumptions and constants used by Rayleigh in his absolute calibration have been carefully checked, with a resulting small change in the absolute intensity that he had reported. Since Rayleigh worked with wide bandpass filters, a discussion of current knowledge of the night-sky continuum and its correlation with the green line has also been included. (Author)

AD-416 305 Div. 2
(TISTB/AAR) OTS price $4.60

Travelers Research Center, Inc., Hartford, Conn.
A PLAN FOR THE TEST AND EVALUATION OF TERMINAL FORECASTING TECHNIQUES (PTET) 2-24 HOUR FORECAST LENGTHS,
by L. J. Reed, A. H. Murphy, and I. Enger.
Sep 61, 40p. Rept. no. TRC5; Technical memo. no. 1
Contract FAA/BRD363

Unclassified report

Descriptors: (*Weather forecasting, Analysis), Ceiling, Visibility, Wind, Velocity, Temperature, Actimeters, Dew, Computers, Climatology.

This memorandum presents the test and evaluation procedures to be carried out under Project I, Task 6 of Contract FAA/BRD-363. The coordination of these procedures with other tasks under Project I is described. A summary is presented of the civil and military terminals to be included, the parameters to be forecast, the forecast lengths and valid times to be examined, the objective forecasting techniques to be considered, and the verification scores to be employed. Short descriptions and implementation schedule of the pertinent computer programs are presented. Finally, estimates are made of the computer time necessary to complete the testing and evaluation proposed in this plan. (Author)

AD-416 306 Div. 2
(TISTP/FR) OTS price $2.60

Travelers Research Center, Inc., Hartford, Conn.
A PLAN FOR THE INTEGRATION OF RADAR AND ROUTINE DATA IN THE OBJECTIVE ANALYSIS OF CLOUD, PRECIPITATION, AND CONVECTIVE ACTIVITY,
by Richard J. Reed. Dec 61, 17p. Rept. no. TRC20; Technical memo. no. 11
Contract FAA/BRD363

Unclassified report

Descriptors: (*Meteorological radar, Meteorological parameters), Meteorological parameters, Data, Thunderstorms, Atmospheric precipitation, Clouds, Analysis.

The manner in which radar data can be combined with routine surface observations was studied in order to arrive at objective analyses of cloud, precipitation and convective activity which are superior in accuracy to those obtainable from surface observations alone. The problem was examined with three different types of radar input in mind: (1) PPI scope and RHI scope records, (2) CAPPI data and (#) the facsimile 'Radar Summary' transmitted at 3-hourly intervals from Kansas City. Only the third type of information is routinely available. However, it is useful to consider more ideal types of data which may be available on special occasions or which may become routinely available in the not too distant future. The great advantage of radar is in its ability of define small-scale phenomena which may escape detection in the regular observing network. Procedures are first suggested for incorporating radar data into the analysis of convective systems, and possible uses in cloud analysis where it is obvious from the outset that the radar has limited application are considered later. For the purpose of illustration, the thunderstorm is regarded as a unit of convective activity. (Author)

AD-416 319 Div. 2
(TISTP/FR) OTS price $2.60

Sacramento Peak Observatory, Sunspot, N. Mex.
DYNAMICS OF LIMB FLARES AND THE PINCH-EFFECT,
by A. B. Severny, E. F. Shaposhnikova, and tr. by Alice B. Dunn. 1960, 19p. Solar research note no. 39
Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs. vol. 24, pp. 235-257, 1960.

Descriptors: (*Solar flares, Magnetic pinch), Plasma medium.

AD-416 327 Div. 2, 25
(TISTP/WH) OTS price $3.60

Sacramento Peak Observatory, Sunspot, N. Mex.
A SPECTROPHOTOMETRIC STUDY OF SOLAR PROMINENCES,
by Y. Shih-Huei and tr. by Alice B. Dunn. 1961. 38p. Solar research note no. 42
Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs. vol. 25, pp. 180-231, 1961.

Descriptors: (*Solar flares, Spectrophotometers), (*Spectrophotometers, Solar flares), (*Emissivity, Sun), Solar spectrum, Spectra (Visible and ultraviolet).

The study is based mainly on spectrograms of prominences obtained with an Echelle-spectrograph, which permits simultaneous photography of the whole visible and a large part of the ultraviolet spectrum on one and the same plate, with high dispersion and resolving power. The spectrograms of 10 prominences are reduced and profiles of 209 emission lines obtained. The half-widths, central intensities, equivalent widths and some other characteristics are determined. (Author)

AD-416 341 Div. 2, 8, 30
(TISTE/JWS) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
ERROR ANALYSIS OF THE MODIFIED HUMIDITY-TEMPERATURE MEASURING SET, AN/TMQ-11,
by R. W. Lenhard, Jr. and B. D. Weiss. Aug 63, 21p.
Proj. 433L
AFCRL Instrumentation for Geophysics and Astrophysics no. 28; Rept. no. 63 845
Unclassified report

Descriptors: (*Meteorological instruments, Dew point), (*Hygrometers, Tests), Errors, Tables, Temperature, Humidity, Statistical analysis, Measurement.

The results of tests performed at AFCRL to determine how closely the modified AN/TMQ-11 agrees with the ML-24 psychrometer are presented. The analysis is based on 2863 observations obtained under field conditions. All values were accepted as reported with no corrections in the recorded data. The AN/TMQ-11 responds to changes in dew point and temperature in the same manner as the ML-24. The tests indicate that a bias error exists in the AN/TMQ-11 dew-point sensors. If the bias of an individual dew-point sensor is determined and readings are adjusted compensate for this bias, dew-point temperature can be accepted as indicated or recorded. (Author)

AD-416 350 Div. 2
(TISTP/FR) OTS price $4.60

Texas A. and M. Coll. College Station.
INVESTIGATION OF RADIATION PATTERNS IN THE 8-12 MICRON RANGE AS OBSERVED BY TIROS III OVER THE CARIBBEAN SEA DURING THE PERIOD 20-21 JULY 1961,
by Paul Irvin Mohler. Aug 63, 36p.
Unclassified report

Master's thesis. Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Infrared radiation, Clouds), Clouds, Meteorological satellites, Troposphere, Barometric pressure, Temperature, Water vapor.

Two cases of infrared radiation measurements in the 8-12 micron range were studied. The radiation readings are related to cloud patterns and surface temperatures in the Caribbean Sea and adjacent areas. These two cases demonstrate some of the synoptic uses and limitations of the radiation data for cloud detection and surface temperature determinations. The radiation data were found to be useful in determining areas of general cloudiness. An attempt to determine surface temperatures was hindered somewhat by the presence of clouds in the area under investigation. It was also found that the presence of water vapor in the atmosphere absorbs a substantial amount of energy radiated from the earth's surface. (Author)

AD-416 408 Div. 2
(TISTB/AAR) OTS price $10.50

Aerometric Research, Inc., Goleta, Calif.
THE USE OF METEOROLOGICAL SATELLITE CLOUD PHOTOGRAPHS IN SILENT AREA FORECASTING.
Final rept.,
by Raymond E. Kerr, Jr., John G. Cronin, John R. Thompson and Robert D. Elliott. 20 Aug 63, 127p.
Contract N189 188 55464A
Unclassified report

Descriptors: (*Meteorology, Satellites), (*Photographs, Clouds), Weather forecasting, Analysis, Aerial photographs, Cloud cover.

AD-416 421 Div. 2
(TISTP/FEN) OTS price $3.60

Norwegian Meteorological Inst., Oslo.
LARGE-SCALE SPECTRAL ENERGY CHANGES IN BAROTROPIC AND BAROCLINIC MOTIONS,
by Ragnar Fjortoft. 1963, 1v. Rept. no. technical note no. 3
Contract AF61 052 374
AFCRL Rept. no. 63 883 Unclassified report

Descriptors: (*Burometric pressure, Atmosphere), (*Air mass analysis, Atmospheric motion), Atmospheric temperature, Meterological parameters, Cyclones, Motion, Energy, Weather forecasting, Wind, Equations, Meterological charts, Vortices.

The problem of spectral energy fluxes in barotropic motions were previously considered. Some supplementary considerations are presented, together with an example from the atmosphere. The condition for a free convertion of potential into kinetic energy, in geostrophically balanced flow were previously studied, assuming temperature to change according to advection. Vertical velocities are included in the adiabatic equarion. Rhw impoerance of non-linear interactions between temperature- and velocity fields, for the formation of disturbances, is reported. (Author)

AD-416 436 Div. 2
(TISTP/FR) OTS price $11.50

Geophysical Inst., U. of Alaska, College.
THE CROSS MODULATION OF COSMIC NOISE: A TECHNIQUE FOR INVESTIGATING THE DISTURBED D REGION,
by Robert F. Benson. May 63, 142p. Scientific rept. no. 1
Contract AF19 604 8833, Proj. 7663, Task 766302
AFCRL 63 624 Unclassified report

Descriptors: (*Ionosphere, Modulation), Electrons, Electron density, Radio waves, Extraterrestrial radio waves, Modulation, Attenuation.

The observed cross modulation of cosmic noise in the lower D region was found to be in better agreement with the alternate theory of cross modulation, proposed by Huxley in 1953, than with the current theory of cross modulation. The electron collision frequency determinations are in agreement with the results of previous independent experiments. (Author)

AD-416 448 Div. 2
(TISTB/AAR) OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
HEAT FLUX AND SURFACE STRESS ON AND NEAR AN ISLAND IN THE TRADE WIND REGION.
Second semi-annual progress rept., 5 Dec 62-15 July 63,
by E. B. Kraus. 15 July 63, 17p. Rept. no. 2; Ref. no. 63 29
Contract DA36 039SC90784
Unclassified report

Descriptors: (*Meteorology, Heat), (*Geology, Surface tension), Wind, Temperature, Recording systems, Design, Meters, Gravity, Construction Buoys.

The report describes the design, construction and expected performance of a stable instrument buoy, which is capable of being anchored in water depth between 20 and 200 meters. Roll stability and minimization of exciting forces due to waves is to be achieved by an extremely tight moor rather than by a large mass or a very low center of gravity. The construction and the coding of observations of a wave recorder are also described. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-415 876 Div. 3, 10, 4
(TISTM/ODN) OTS price $3.60

North American Aviation, Inc., Los Angeles, Calif.
SPECTRAL EMISSIVITY OF FLASH COMBUSTION. REACTION STUDY PROGRAM.
Progress rept., 1 July-1 Aug 63.
5 Aug 63, 27p. Rept. no. NA63 871
Contract Nonr4236 00
Unclassified report

Descriptors: (*Light, Chemical reactions), (*Chemicals, Light), Magnesium, Aluminum, Sodium compounds, Flames, Temperature, Metals, Combustion, High-temperature research, Energy, Ignition, Circuits, Zirconium, Beryllium, Bibliographies, Brightness, Emissivity, Spectroscopy, Test equipment, High-pressure research, Phototubes.

A computer program originally directed towards predicting adiabatic flame temperatures in evaluating rocket propellant performance has been adapted to find potentially good chemical light sources. Results have discolosed several chemical reactions which proceed at a temperature greater than 5500 K, which will be candidates for future investigations. Test equipment has been designed, constructed and calibrated to yield brightness temperature measurements of chemical flashes. Two separate experimental setups have been operating, permitting cross-check procedures to be employed. One arrangement consists of a high-resolution spectrograph and two photomultiplier tubes to give detailed, narrow-band spectral radiance measurements, while the other setup consists of four filter-plus-phototube sensors for rapid-sequence wide-band measurements. Photometric studies of the light output of chemical reactions have been started to supplement the spectral photography previously undertaken. Sample data have been taken using aluminum plus magnesium plus sodium chlorate. This sample was chosen for convenience and ease of handling rather than light output capability or short reaction time. (Author)

AD-416 033 Div. 3, 4
(TISTM/EJH) OTS price $3.60

Resin Research Labs., Inc., Newark, N. J.
INVESTIGATION OF NEW TYPE POLYMERS TO BE USED IN PYROTECHNIC FUELS FOR THERMAL DISSEMINATION OF AGENTS.
Bi-monthly progress rept.
30 Aug 63, 27p. Rept. no. 984
Contract DA18 108AMC260
Unclassified report

Descriptors: (*Polymers, Pyrotechnics), (*Pyrotechnics, Fuels), (*Carbohydrates, Pyrolysis), (*Organic compounds, Pyrotechnics), Chemical reactions, Sucrose, Glucose, Lactose, Fuels, Dehydration, Organic nitrogen compounds, Condensation reactions, Chemical warfare agents, Diffusion, Feasibility studies, Alcohols, Glycosides.

During the first two months of investigation into the production of anhydrous syrups from simple sugars, the following reactions were studied: (1) sugar pyrolysis; (2) sugar-formaldehyde reactions; (3) sugar condensations with nitro compounds; and (4) sugar reactions with polyols. Most promising results have been obtained with dipropylene and diethylene glycol reaction products with glucose. The pyrolysis experiments have all led to the formation of glassy solids. (Author)

4. CHEMISTRY

AD-415 621 Div. 4
(TISTM/EJH) OTS price $1.10

University Coll., Dublin (Eire).
(No title).
Final rept.
22 Aug 63, 8p.
Contract N62558 3560, Task NR051 417
Unclassified report

Descriptors: (*Organic compounds, Complex compounds), (*Complex compounds, Metal-organic compounds), (*Decomposition, Metal-organic compounds), Photochemistry, Reduction (Chemistry), Solutions, Polymers, Spectra (Infrared), Carbonyl group, Water, Organic solvents, Magnetic properties, Chromium compounds, Chemical reactions, Atomic orbitals, Benzene.

This report is a summary of the work carried out during the final year of the contract and a brief resume of the results of the complex contract. EExperimental and theoretical studies of both ground state properties and reactivities of organometallic complexes have been made. Electron distribution effects in substituted tricarbonylarene-chromiums have been explained by molecular-orbtial theory. ''Stable'' pi complexes were found to undergo most interesting photolysis and produce hitherto unknown ethoxides. Decomposition of stable pi-complexes in acid solutions can also lead to reduction of other organic systems. Unstable pi-complexes can be used as sites for the formation of metal hydrogen bonds with concomitant reduction. (Author)

AD-415 662 Div. 4
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF OBTAINING BORON NITRIDE,
by G. V. Samsonov, M. G. Koval'chenko and V. M. Sieptsov. 23 Apr 63, 3p.
FTD TT63 65 Unclassified report

Trans. from Russian Patent Nr. 129647, (Appl. Nr. 641773/23, 19 October 1959), pp. 1-2, 1959.

Descriptors: (*Boron compounds, Nitrides), Patents, Carbon, Boric acids, Purification, Manufacturing methods.

Method of obtaining boron nitride by nitration of a mixture of boric anhydride and carbon at high temperatures, distinguished by the fact, that for the purpose of increasing the degree of purity and the yield of final product, the basic mixture, consisting of 85% (by weight) of boric acid and 15% (by weight) of carbon, after dehydration is subjected to two-stage nitration at temperatures of 1500 and 1700 degrees respectively. (Author)

AD-415 669 Div. 4, 25
(TISTM/BRW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHOSPHIDES (SELECTED PARTS),
by G. V. Samsonov and L. L. Vereikin. 12 Mar 63, 27p.
FTD TT62 1763 Unclassified report

Trans. from Fosfidy, Izatel'stvo AN Ukrainskoy SSSR, Kiev, pp. 3-4, 45-54, 68-70, and 114-118, 1961.

Descriptors: (*Inorganic compounds, Phosphides), (*Phosphides, Inorganic compounds), Alloys, Semiconductors, Vanadium compounds, Niobium compounds, Tantalum compounds, Chromium compounds, Molybdenum compounds, Tungsten compounds, Thorium compounds, Uranium compounds, Neptonium compounds, Plutonium compounds, Synthesis (Chemistry), Crystal lattice, Crystal structure, Dissociation, Phase studies, Metallurgy, Coatings, Catalysts, Pyrotechnics.

AD-415 697 Div. 4, 7
(TISTM/BRW) OTS price $2.60

Calvin Coll., Grand Rapids, Mich.
SILVER MIGRATION AND TRANSPORT MECHANISM STUDIES IN SILVER OXIDE-ZINC BATTERIES.
Quarterly technical progress rept. no. 5, 1 May-1 Aug 63,
by T. P. Dirkse and L. A. Vander Lugt. 1 Aug 63, 24p.
Contract AF33 657 8689, Projs. 8173; and 3145, Tasks 817304 16; and 61079 16
Unclassified report

Descriptors: (*Alkaline cells, Battery separators), (*Silver, Transport properties), Ions, Tracer studies, Isotopes, Electrochemistry, Silver compounds, Oxides, Zinc, Membranes, Solubility, Potassium compounds, Hydroxides.

A further study has been made of the mechanism by which silver is transported in a silver-alkaline battery. This transport appears to take place primarily by diffusion. Two screening tests have been devised and tested for determining the tendency of a separator to pick up silver from the electrolyte and also its ability to prevent transport of silver through the material. (Author)

AD-415 706 Div. 4
(TISTM/EJH) OTS price $1.60

Naval Propellant Plant, Indian Head, Md.
AMINE SALTS,
by C. J. Barnes and A. J. Matuszko. 27 May 63, 11p. Technical rept. 128
NAVWEPS Rept. 8028 Unclassified report

Descriptors: (*Organic compounds, Amines), (*Salts, Amines), Complex compounds, Nitric acid, Perchlorine acid, Organic nitrogen compounds, Synthesis (Chemistry), Stability.

Several nitric acid, perchloric acid, and nitroform salts of amines were prepared. Only monoaddition perchloric acid and nitric acid salts of 2- and 4-aminopyridines were isolated. Perchloric acid with 3-aminopyridines yielded the monosalt. Disalts synthesized were 3-aminopyridine x 2HNO3, melamine x 2HNO3, and ethylenediamine x 2HClO4. Tetrasalts of pentaerythrylamine with perchloric acid and nitroform were prepared for the first time. (Author)

AD-415 732 Div. 4, 20
(TISTM/TCG) OTS price $1.60

Noyes Chemical Lab., U. of Illinois, Urbana.
ELECTRON COUPLING OF NUCLEAR SPINS. VII. J SUB FF FOR 2-FLUOROBENZOTRIFLUORIDES,
by H. S. Gutowsky and V. D. Mochel. 7 Apr 63, 15p. Technical rept. no. 63
Contract Nonr183413, Proj. NR051 215
Unclassified report

Descriptors: (*Nuclear spins, Fluorine compounds), (*Organic compounds, Fluorine compounds), Nuclear resonance, Electron transitions, Excitation, Nuclear magnetic resonance, Electrostatic fields, Deformation, Molecular rotation, Benzene, Aromatic compounds.

The nmr spectra of several 2-F,6-X-benzotrifluorides yield values for J sub FF between the 2-fluorine and the fluorines in the CF3 group of 13 to 34 cps, depending upon the 6-substituent. The magnitude of this J sub FF is proportional to the chemical shift of the CF3 group and to the size of the 6-substituent. Two related factors appear to be involved: (a) the rotational configuration of the CF3 group with respect to the plane of the benzene ring, and (b) electrostatic deformation of the electron distribution about the fluorines in the CF3 group. Our results for the benzotrifluorides and values reported earlier for the cis F-CF3 coupling in CF3CS=CFY compounds are consistent with little or no hindrance to CF3 group rotation in the latter. (Author)

AD-415 893 Div. 4
(TISTM/EJH) OTS price $1.60

Rochester U., N. Y.
PHOTOISOMERIZATION OF 5-HEXEN-2-ONE,
by R. Srinivasan. 24 Aug 59, 13p.
Contract AF18 600 1528
AFOSR TN59 876 Unclassified report

Descriptors: (*Organic compounds, Photochemistry), (*Molecular isomerism, Photochemistry), (*Photochemistry, Organic compounds), Ultraviolet radiation, Spectra (Infrared), Spectra (Visible and UV), Nuclear magnetic resonance, Stability, Alkenes, Carbonyl group.

The photochemistry of 5-hexen-2-one has been studied in the vapor phase in the temperature range from 27 to 139 degrees at 3130 angstroms and also with radiation from an unfiltered mercury arc. The compound was found be very stable towards photolysis. The most important product at 3130 angstroms up to 139 degrees was an isomer, whose structure is indicated in the report. Evidence for the structure is based on the ultraviolet, infrared, nuclear magnetic resonance, and mass spectra of the product. The only other product at 3130 angstroms that was identified was carbon monoxide. At shorter wavelengths, in addition to these products, methane, C2 and C3 hydrocarbons, acetone and biacetyl were identified. Although the ultraviolet absorption spectrum of 5-hexen-2-one resembles that of 2-hexanone, its photochemical stability is similar to that of unsaturated carbonyl compounds with the double bond conjugated with the carbonyl group. (Author)

AD-415 894 Div. 4
(TISTM/ODN) OTS price $1.10

Rochester U., N. Y.
THE PHOTOLYSIS OF AMMONIA (N15H3) IN THE PRESENCE OF NITRIC OXIDE,
by R. Srinivasan. 13 Nov 59, 7p.
Contract AF18 600 1528
AFOSR TN59 1196 Unclassified report

Descriptors: (*Nitrogen comqounds, Oxides), (*Photochemistry, Nitrogen compounds), (*Ammonia, Photochemistry), Chemical reactions, Isotopes, Pressure, Labeled substances.

At room temperature, and at a pressure of ammonia of 40 ± 1 mm, the rate of production of N-15N-14 and N2-14 are presented as a function of nitric oxide pressure. There was no evidence for more than a trace of N2-15, while the Nitrous oxide was found to be wholly N2-140. The ratio of nitrous oxide to nitrogen was observed to vary from 0.21 at 4.0 mm of nitric oxide to 0.27 at 12.5 mm. This may be compared with the values of 0.36 to 0.26 for the same pressure range found by Serewicz and Noyes. Since they observed that a change in the ratio of the products, a better agreement between the relative rates of production of nitrous oxide and nitrogen may not be expected. (Author)

AD-415 896 Div. 4, 25
(TISTM/EJH) OTS price $1.60

Alabama U., University.
A STUDY OF THE GALLIC ACID COMPLEXES OF NIOBIUM. TANTALUM, TITANIUM. AND IRON.
by E. L. Grove, Lodric Maddox, and W. S. Jeffery. 26 July 60, 11p.
Contract AF18 600 1567
AFOSR TN59 1183 Unclassified report

Descriptors: (*Organic compounds, Colorimetry), (*Niobium, Chemical analysis), (*Tantalum, Chemical analysis), (*Titanium, Chemical analysis), (*Iron, Chemical analysis), (*Colorimetry, Organic compounds), Hafnium, Vanadium, Sodium, Rhenium, Thorium, Zirconium, Alloys, Metalorganic compounds, Spectroscopy, Phenols, Metals.

The use of gallic acid in a spectrophotometric procecure for tantalum, niobium and other metals was investigated. The optical properties of Nb, Ta and several other metal chelates were explored. (Author)

AD-415 902 Div. 4
(TISTM/AM) OTS price $16.00

General Mills, Inc., Minneapolis, Minn.
FUNDAMENTAL STUDIES OF THE DISPERSIBILITY OF POWDERED MATERIALS.
Final rept. 3 June 60-31 June 63,
by J. H. Nash, G. G. Leiter, A. P. Johnson, D. Stender and H. W. Zeller. 15 Mar 63, 1v.
Rept. 2381
Contract DA18 108 405CML824, Proj. 81524
Unclassified report

Descriptors: (*Powders, Organic materials), (*Organic materials, Powders), Physical properties, Tensile properties, Coatings, Shear stresses, Humidity, Grinders, Adsorption, Gases, Particle size, Density, Theory, Electrostatics, Test method, Data, Equations, Test equipment, Liquids, Sedimentation, Strain gages, Electron microscopy, Albumins, Eggs, Waxes, Crystals.

This is a fundamental study of factors affecting the flow and dispersibility of finely divided organic powders. Most of the investigations pertain to three base powders: saccharin, Carbowax 6000, and Span 60. These powders were chosen to represent crystalline, waxy, and gummy types of powders, respectively. Late in the program, a fourth powder (egg albumin) was added to the list of powders to be investigated. The preparation of powders including grinding, deagglomeration, blending, coating with surface active agents, etc. is discussed. The various tests for measuring physical properties of powders including particle size distribution, shear strength, bulk tensile strength, bulk density, dynamic angle of repose, dispersibility, and electrostatic charge are described. The major studies are: (1) bulk tensile strength tests, (2) effects of humidity on powder properties, (3) effects of antiagglomerant agents on powder properties, (4) mechanism by which Cab-O-Sil functions, (5) effects of surface active agents on powder properties, (6) effects of adsorbed foreign vapors on powder properties, (7) effects of removal of adsorbed gases and vapors, (8) energy required to disperse a powder sample, (9) properties of compacted powders, and (10) egg albumin studies. (Author)

AD-415 903 Div. 4, 14
(TISTM/EJH) OTS price $1.10

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
DETERMINATION OF LEAD 2-ETHYL HEXOATE,
by L. G. Dillman, W. P. Reed and A. W. Tiedemann. Oct 62, 4p. ABL Z53
Contract Nord16640
Unclassified report

Paper presented at 18th meeting JANAF-NASA-ARPA Panel on Analytical Chemistry of Liquid and Solid Propellants, 13-15 August 1962.

Descriptors: (*Embedding substances, Polarographic analysis), (*Isocyanate plastics, Embedding substances), (*Catalysts, Embedding substances), (*Polarographic analysis, Lead compounds), (*Lead compounds, Polarographic analysis), Chemical analysis, Carboxylic acids.

Multron R-18, Toluenediisocyanate, and L-26 are components of a polyurethane potting compound. The polyurethane polymerization is catalyzed by the Lead 2-ethyl hexoate (L-26). L-26 was used at the very low ratio to R-18 of 1:1,000. It is desirable for processing accuracy to premix the L-26 with the R-18 before adding the other components of the polyurethane. The quantity of L-26 catalyst is critical. Since polarography is especially suited to trace analysis and lead is easily determined polarographically, this method was investigated as a technique analysis. (Author)

AD-415 958 Div. 4
(TISTM/EJH) OTS price $21.00

Cambridge U. (Gt. Brit.).
SIXTH INTERNATIONAL SYMPOSIUM ON FREE RADICALS. 2-5 July 63, 1v.
AFOSR 5219 Unclassified report

Descriptors: (*Free radicals, Symposia), (*Symposia, Free radicals), (*Organic compounds, Free radicals), Fluorescence, Spectra (Visible and UV), Dissociation, Peroxides, Radiation chemistry, Electrons, Spin, Resonance, Alkenes, Reaction kinetics, Cryostats, Photochemistry, Paramagnetic resonance, Aromatic compounds, Heterocyclic compounds, Decomposition, Hydrocarbons, Hydrogen compounds.

AD-416 030 Div. 4, 25, 14
(TISTM/EJH) OTS price $6.60

Plastics Lab., Princeton U., N. J.
ELECTRONIC CONDUCTION IN SOME POLYMERIC SYSTEMS,
by J. A. Krebs and C. Cappas. 30 June 63, 52p.
Rept. no. 67C
Contract DA31 124ARO D21, Proj. 356 375
AROD 3654 4 Unclassified report

Descriptors: (*Polymers, Semiconductors), (*Organic compounds, Semiconductors), (*Semiconductors, Polymers), Polycyclic compounds, Carbonyl group, Organic nitrogen compounds, O-heterocyclic compounds, Molecular structure, Resistance (Electrical), Hall effect, N-heterocyclic compounds, Electrons, Spin, Resonance, Synthesis (Chemistry).

The main features of electronic conduction in organic substances were reviewed. Experiments were made to characterize semiconductivity in powdered polyacenes and in amorphous polyphenylacetylene. The influence of various factors such as the number of fused rings per monomeric unit, the introduction of monomers with carbonyl groups, and the introduction of heteroaromatic monomers was studied. Spin concentration and mobilities of some typical samples were measured. The classical band theory was reviewed to determine its applicability to organic polymers. Some new ideas on the theory of polymer conduction were developed. (Author)

AD-416 046 Div. 4, 25
(TISTM/AMS) OTS price $1.10

Cornell U., Ithaca, N. Y.
THE EFFECT OF AN ELECTRIC FIELD ON THE CRITICAL OPALESCENCE,
by P. Debye and K. Kleboth. 7 June 63, 9p.
Technical rept. no. 8
Contract Nonr40117, Proj. NR051 360
Unclassified report

Descriptors: (*Liquids, Electric fields), (*Optical properties, Liquids), (*Electric fields, Liquids), Dielectric properties, Density, Light, Light transmissions, Optical phenomena, Chemical properties, Mixtures, Test methods, Tests, Scattering.

AD-416 143 Div. 4
(TISTM/EJH) OTS price $2.60

Mississippi U., University.
SOLVENT EFFECTS ON CHARGE-TRANSFER COMPLEXES. I. THE s-TRINITROBENZENE-NAPHTHALENE COMPLEX IN CARBON TETRACHLORIDE, n-HEPTANE, n-HEXANE, CYCLOHEXANE, CHLOROFORM, OR CARBON DISULFIDE,
by C. C. Thompson, Jr. and P. A. D. de Maine. 1962, 28p.
Grant AF AFOSR62 19
AFOSR Rept. no. 4832 Unclassified report

Descriptors: (*Organic solvents, Solvent action), (*Complex compounds, Solvent action), (*Organic compounds, Solvent action), (*Solvent action, Organic compounds), Absorption spectrum, Spectra (Visible and ultraviolet), Molecular spectroscopy, Reaction kinetics, Temperature, Heat of formation, Aromatic compounds, Organic nitrogen compounds, Polycyclic compounds, Hydrocarbons.

Formation constants and absorptivities for the 1:1 s-trinitrobenzene-naphthalene complex in six inert solvents (CCl_4, n-hexane, cyclohexane, n-heptane, $CHCl_3$, or CS_2) were calculated with spectrophotometric data collected at fifteen wavelengths between 3300 and 4000 A at 20 and 45 C. All data were processed with an IBM 1620-60 K computer. Absorptivities for the complex at the absorption maxima (near 3600A) at 20 C vary from 1294 (-22) for n-heptane to 1540 (±13) for n-hexane. As the temperature is increased from 20 to 45 C., the absorptivities decrease by approximately 10% except in $CHCl_3$ systems where those between 3650 and 4000 A are unchanged. The formation constant(K) is independent of wavelength at each temperature in all solvents except n-heptane where at 20 C. K, in moles/liter units, it is 9.58 (±0.17) for wavelengths between 3300 and 3700 A, and gradually increases to 14.61 (±0.17) at 4000 A. At 45 C. K in n-heptane is 6.12 (±0.09) at wavelengths up to 3850 A, and it increases to 8.27 (±0.09) at 4000 A. Average values for K at 20 C. vary from 1.82 (±0.08) in $CHCl_3$ to 9.58 (±0.17) in n-heptane. (Author)

AD-416 362 Div. 4, 25
(TISTM/EJH) OTS price $12.00

California U., Los Angeles.
X-RAY STUDIES OF UNUSUAL ORGANIC COMPOUNDS.
Final rept., 1 Sep 59-31 Dec 62,
by K. N. Trueblood, D. A. Bekoe, M. E. Burke, C. L. Coulter, and P. K. Gantzel. Mar 63, 1v.
Contract AF49 638 719
AFOSR Rept. no. 5135 Unclassified report

Descriptors: (*Organic compounds, Crystal structure), (*Crystal structure, Organic compounds), (*X-ray photography, Crystal structure), Crystal lattices, Molecular structure, N-Heterocyclic compounds, Organic nitrogen compounds, Alkenes, Polycyclic compounds, Metalorganic compounds, Programming (Computers), Mathematical analysis, Organic sulfur compounds, Perchlorates, Oxygen compounds, Cyanides, Ferrocenes.

Contents: Unpublished Work--The crystal structure of 5-keto-1,5-dihydrobenz(cd)indole; The crystal structure of the hexahydrated calcium salt of hexacyanoisobutene; The crystal structure of the cubic form of tetracyanoethylene; The crystal structure of 1,1'-(tetramethylethylene)ferrocene; Miscellaneous structural studies; and Crystallographic computing. Reports and Publications--Crystallographic calculations on SWAC and on the IBM 709; Comparison of various least squares refinement techniques; Crystal structure of the diolefin of (2.2)paracyclophane; Crystal structure of trimethyloxosulfonium perchlorate; and Crystal structure of (3.3)paracyclophane.

AD-416 366 Div. 4
(TISTM/ODN) OTS price $1.60

Bonn U. (Germany).
PHOTOCHEMICAL INVESTIGATIONS IN THE FAR ULTRAVIOLET.
Final technical rept., 1 May 62-30 Apr 63,
by W. E. Groth. 14 May 63, 11p.
Grant AF EOAR62 73
AFCRL Rept. no. 63 884 Unclassified report

Descriptors: (*Photochemistry, Gases), (*Gases, Photochemistry), Nitrogen, Ions, Molecules, Ammonia, Hydrazine, Krypton, Xenon, Fluorescence, Decomposition, Ionization, Mass spectroscopy, Helium, Ultraviolet spectroscopy.

The photoionization of the nitrogen molecule was investigated in an apparatus consisting of a capillary spark as light source, a Seya-Namioka monochromator, an ion source, and a four pole field mass spectrometer. A flash photolysis apparatus for the extreme ultraviolet was developed. The reaction chamber is separated from the discharge chamber by LiF windows; the flash energy is distributed to 12 parallel spark gaps fired synchronically with a time resolving power of 2 - 3 microsec. In fluorescence experiments with the resonance wave lengths of Krypton and Xenon an NH transition was observed. Investigations of the photodissociation of simple molecules at wavelengths < 1000 Angstroms showed fluorescence of the photodissociation products in the region 1100 - 1500 Angstroms in the case of H_2, O_2, NO, H_2O, CO_2, but not of NH_3, N_2O, N_2, and CO. The photolysis of NH_3 was investigated with the resonance wave lengths of Krypton and Xenon, and the Hg line 1849 Angstroms in static and flow systems. The quantum yield of NH_3 decomposition and of N_2H_4 formation was measured in dependence on the wave lengths pressure, flow velocity, and added gases. (Author)

AD-416 373 Div. 4
(TISTM/ODN) OTS price $2.60

University of Southern Calif., Los Angeles.
FLOW IN THIN LIQUID FILMS,
by J. Lyklema, P. C. Scholten, and K. J. Mysels. 1962, 24p.
Contract AF49 638 309
AFOSR 5174 Unclassified report

Descriptors: (*Films, Liquids), (*Liquids, Films), (*Soaps, Films), (*Fluid flow, Films), Laboratory equipment, Thickness, Optical instruments, Optical phenomena, Surfaces, Lithium compounds, Chlorides, Viscosity, Test methods, Measurement.

An improved experimental method for studying vertical soap films slowly pulled out of a solution is described and the interpretation of the optical thickness measurements is discussed. The behavior of mobile films presents complications which are described. Rigid films on the other hand give results for films thicker than 800 - 1100 Angstroms, which agree very closely with Frankel's law relating film thickness to the velocity of pull-out. Since Frankel's law is derived on the assumption that the viscosity is constant up to the monolayer, this agreement proves the absence of any thick rigidified water layers (or of slip) in the neighborhood of the surface. (Author)

AD-416 424 Div. 4, 7
(TISTM/REB) OTS price $9.10

Iowa State U. of Science and Tech., Ames.
ELECTROCHEMICAL PROCESSES IN FUSED SALTS,
by Lowell Alvin King. 1963, 99p.
Unclassified report

A dissertation submitted in partial fulfill-

ment of requirements for Degree of Doctor of Philosophy.

Descriptors: (*Electrolytic cells, Salts), (*Salts, Electrical conductance), (*Fuel cells, Carbon dioxide), Direct current, Measurement, Melting, Electrochemistry, Production, Electrical conductance.

AD-416 462 Div. 4, 14
(TISTM/REB) OTS price $4.60

Plastics Lab., Princeton U., N. J.
MOLECULAR STRUCTURE PARAMETERS IN CERTAIN SEMICONDUCTING POLYMERS,
by J. H. T. Kho and C. Cappas. 15 June 63, 41p.
Technical rept. no. 67B
Contract DA31 124ARO D21
AROD 3654 5 Unclassified report

Descriptors: (*Semiconductors, Organic compounds), (*Polymers, Molecular structure), (*Organic compounds, Semiconductors), (*Molecular structure, Electrical properties), Synthesis (Chemistry), Copolymerization, Resistance (Electrical), Pressure, Temperature, Thermoelectricity, Measurement, Impurities, Complex compounds, Beryllium, Copper, Spin, Electrons, Salts, Polycyclic compounds, Aromatic compounds, Hydrocarbons, Carboxylic acids.

Three series of highly conjugated polyacene quinone radical (PAQR) semiconducting polymers were synthesized and their electronic behavior studied. The effects of the following variables on the electrical properties of the PAQR polymers were examined: (1) hydrocarbon portion of the polymers; (2) acidic portion of the polymers; (3) copolymerization and mole ratio of starting monomers; (4) metallic salt formation; and (5) pressure and temperature. Room temperature resistivity was found to be indirectly dependent on the number of fused rings of monomer, ionization constant of acidic monomer, square root of pressure applied and directly on the energy interval of all the PAQR polymers studied. Pressure coefficient of resistivity was found to be a direct function of the energy interval of the polymers. Spin concentration varies directly with carrier concentration and indirectly with room temperature resistivity of the PAQR polymers. (Author)

5. COMMUNICATIONS

AD-415 636 Div. 5
(TISTE/JWS) OTS price $6.60

Bell Telephone Labs., Inc., Whippany, N. J.
AIRBORNE COMMUNICATION SYSTEM MARCOM RELAY.
Quarterly progress rept. no. 4, 15 Mar-15 June 63.
15 July 63, 55p.
Contract DA36 039sc89250, Proj. 3B55 04 001 01
Unclassified report

Descriptors: (*Microwave relay systems, Airborne, Test methods, Data, Recording systems, Data processing systems, Logistics, Test sets, Test equipment (Electronics), Antennas.

The objective of this investigation is to gather and analyze information on air-to-air and ground-to-air microwave propagation and transmission. The findings will aid in predicting the capabilities of multichannel microwave communication systems using airborne radio relay stations and should provide information basic to the design of airborne systems. (Author)

AD-415 967 Div. 5
(TISTM/EJH) OTS price $9.60

Texas U., Austin.
THE CORRECTING FOR AND EXTRACTING OF IONOSPHERIC RELATED FREQUENCY ERRORS PRESENT ON SIGNALS RECEIVED FROM COHERENT, MULTIPLE FREQUENCY, ULTRA-STABLE RADIO TRANSMISSIONS OF ARTIFICIAL EARTH SATELLITES,
by George G. Moore and Crockett L. Slover.
Mar 63, 1v. DRL489; CF2989
Contract NOrd16498, Task UTX5
Unclassified report

Descriptors: (*Doppler effect, Ionosphere), (*Ionosphere, Doppler effect), (*Sattelites (Artificial), Doppler effect), Refraction, Doppler systems, Tracking, Radiofrequency, Errors, Radio transmission, Digital systems, Analog systems.

Ionospheric refraction studies are reviewed, and the effect of refraction errors on the analysis of Doppler shift data from artificial earth satellites is discussed. A method of correcting for first order error is presented, based on an earlier analysis wherein the ionospheric refraction error is expressed in terms of powers of the inverse of the transmitter frequency. Both digital and analog correction systems are described, and comparative results are shown. Extraction of the ionospheric error information in terms of the power series is also described and results are presented as analog recorder charts and plots of computed error quantities. Magnitudes of noted errors are reviewed and noise problems are considered. Recommendations are made regarding equipment, station location, and methods of computation. A detailed description is given of the Refraction Correction System and Refraction Error System resulting from this investigation. The equipment is illustrated by diagrams and photographs. (Author)

AD-416 166 Div. 5, 25, 8
(TISTM/REB) OTS price $10.50

Lockheed Electronics Co., Plainfield, N. J.
INVESTIGATION OF THREE-DIMENSIONAL DISPLAY TECHNIQUES.
Final technical rept.,
by S. S. Verner, R. Lipnick and A. Sussman.
30 Mar 63, 120p.
Contract AF30 602 2688 RASGD, Proj. 5578;
LEC Proj. 23 1451 1000, Task 557803
RADC TDR63 202 Unclassified report

Descriptors: (*Stereoscopic display systems, Target position indicators), (*Fluorescence, Excitation), (*Acoustic equipment, Stereoscopic display systems), Display systems, Feasibility studies, Mercury, Atoms, Ultraviolet radiation, Targets, Sound signals, Images, Scanning, Acoustics, Optical equipment, Ultraviolet equipment, Vapors, Nitrogen, Ultraviolet filters, Narrowband, Theory.

An extensive investigation of stepwise excitation of fluorescence was undertaken during the past year. Several binary systems involving mercury

vapor were examined. A mixture of mercury vapor and nitrogen gas received especially intensive study. Various ultraviolet sources were investigated for intensity of output at 2537 and 4047 Angstroms, and a number of narrowband spectral filters were tested, particularly in the 2537A region. An electro-acoustic method of scanning a large three-dimensional volume was devised to permit simultaneous presentation of multiple targets in analog fashion at any point within the volume. From results so far realized, it is concluded that a 3-D display system appears feasible. (Author)

AD-416 328 Div. 5
(TISTE/OHD) OTS price $16.00

Collins Radio Co., Burbank, Calif.
AN/GSC-4 DATA MODEM SERVICE TEST MODEL DEV DEVELOPMENT.
Final rept.,
by G. G. Fairbanks and J. A. Bloor. 1 Dec 62, 1v.
Contract AF30 602 2342, Proj. 1995, Task 55241
RADC TDR63 171 Unclassified report

Descriptors: (*Data transmission systems, Digital systems), (*Digital systems, Telephone communication systems), Multiplex, Frequency, Phase modulation, Bandwidth, Noise (Radio), Test equipment (Electronics), Errors, Communication theory, Modulators, Demodulators.

The Communications Set, Digital AN/GSC-4 ( ), is a flexible full-duplex, compact unit capable of conveying synchronous digital data over telephone voice facilities of nomina 4 kc bandwidth at a maximum of 5400 bits per second. The set utilizes phase shift modulate frequency multiplexed carrier tones, and encodes either 2 or 3 channels of information on each tone in order to minimize the frequency spectrum bandwidth required for high-speed data transmission. Included in the main body of the report are detailed descriptions of the data modem and its various functions and features. A brief summary of the problems areas encountered and their solutions is also given. The results are also included from which conclusions and recommendations are presented. The integral fault isolation equipment greatly reduces down time due to component failures by providing faulty tone isolation almost immediately without the requirement of external test equipment or experienced operating personnel. The modem exhibits error rates of less than 1 x 10 to the -6th power at 28 db signal-to-white noise (white noise power bandwidth of 3 kc0 at 4800 bits per second. Typical 2400 bits per second error rates are in the neighborhood of 1 x 10 to the -6th power at 15 db signal-to-noise ratios. The 5400 bit per second operation generally falls into the 1 x 10 to the -5th power error rate category with signal-to-noise ratios of 28 db. (Author)

6. DETECTION

AD-415 757 Div. 6, 19, 33
(TISTE/JBM) OTS price $7.60

Hazeltine Technical Development Center, Inc., Indianapolis, Ind.
RADAR SCAN CONVERTER TV MARKER HANDOFF EQUIPMENT.
Final engineering rept.
1 May 62, 68p. Rept. no. 6087
Contract FAA BRD342
Unclassified report

Descriptors: (*Air traffic control systems, Airport radar systems), (*Television display systems, Airport radar systems), (*Airport radar systems, Television display systems), Radar scanning, Television converters, Experimental data, Environmental tests, Radar equipment, Performance (Engineering), Errors, Video signals, Circuits, Mechanical drawings.

Research concerned a design and development program directed toward Radar Scan Converter TV Marker Handoff Equipment. The equipment was designed to operate with all existing and future TV display systems presently on order by the Federal Aviation Agency. After factory and environmental testing, the Radar Scan Converter TV Marker Handoff Equipment was installed in a simulated TV display environment at the National Aviation Facilities Experimental Center, where a thorough technical and operational evaluation occurred. The result of this evaluation is presented. The Radar Scan Converter TV Marker Handoff Equipment demonstrated exceptional reliability, and to a large extent, meets all specified performance requirements. Further discussions of these important items are enclosed herein. However, it would limit the controller range changing and off-centering capability of the future TV display systems. (Author)

7. ELECTRICAL EQUIPMENT

AD-415 638 Div. 7, 8, 30
(TISTE/CAM) OTS price $1.10

Sylvania Electric Products, Inc., Waltham, Mass.
MINUTES OF CALIBRATION REQUIREMENT SUMMARY FORMS (CRS) GUIDANCE SESSION, 27-28 AUGUST 1963.
Aug 63, 8p.
Unclassified report

Descriptors: (*Calibration, Standards), (*Records, Standards), Military requirements, Electronic equipment, Electrical equipment.

AD-415 649 Div. 7, 25
(TISTE/JBM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PULSED MAGNETOGASDYNAMIC AC-GENERATOR,
by P. V. Kachanov and Ye. I. Yantovskiy.
9 Apr 63, 4p.
FTD TT63 118 Unclassified report

Trans. from No. 143172 (Appl. No. 695988/24 of 2 Feb 1961). No. 23, pp. 1-2, 1961.

Descriptors: (*Generators, Magnetohydrodynamics), (*Magnetohydrodynamics, Generators), Alternating current, Gases, Electric discharges.

AD-415 798 Div. 7
(TISTM/AW) OTS price $1.25

General Electric Co., Schenectady, N. Y.
EXPLORATORY ENERGY CONVERSION STUDY OF PHOTON THERMIONICS.
Final rept.,
by M. D. Gibbons. July 63, 42p.
Contract AF33 657 9202, Proj. 8173, Task 817305 18
ASD TDR63 707 Unclassified report

Descriptors: (*Thermionic converters, Photons), (*Photons, Thermionic converters), Energy conversion, Design, Theory, Emissivity, Cesium, Vapor, Ionization, Equations, Test equipment, Test method, Ultraviolet radiation, Spectra (Visible & ultraviolet), Mercury lamps, Xenon lamps, Data.

This study was initiated to determine whether photon processes could increase thermionic converter performance. A converter designed specifically for use on this program was fabricated with a wire grid collector placed in grooves of a sapphire window and located opposite a planar emitter. This converter was tested with five different radiation sources, each with a particular spectral characteristic. The only source that produced an effect on the converter operation was a 200-watt-second xenon flash lamp. This lamp produced a 20% increase in the short circuit current with the converter operating in the ion-rich region, and at least an order of magnitude change in short circuit current in the electron-rich region. In this latter region, the current was still somewhat space charge limited even with the radiation. One-third of the observed effect was due to 0.8 watt cm to minus 2 power of the first resonance radiation, while one-quarter of the observed effect was due to one watt cm to minus 2 power of near ultra-violet. It appears that photon enhanced converters are possible, but it remains to be demonstrated whether the increase in performance will be offset by the complexity of such a converter. (Author)

AD-415 868 Div. 7
(TISTM/BRW) OTS price $2.60

Eagle-Picher Co., Joplin, Mo.
RESEARCH ON AMMONIA BATTERY SYSTEM.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63,
by D. J. Doan and L. R. Wood. 30 Apr 63, 80p.
Rept. no. 11
Contract DA36 039sc89188
Unclassified report

Descriptors: (*Electrolytic cells, Ammonia), (*Ammonia, Electrolytic cells), Feasibility studies, Electrodes, Electrolytes, Anodes (Electrolytic cells), Cathodes (Electrolytic cell), Acids, Bases (Chemistry), Salts, Design, Electrical properties, Liquefied gases.

Additional tests using the reduced cell width have shown the design is functional. Additional effort to obtain information as to slow activation time of the -65 F batteries has been carried out using single cells and batteries. Correlation of impedance decrease and voltage rise indicate the problem is either a gas layer or wetting. Intercell leakage is present but is not considered a major cause of slow activation. Initial trial of increasing the energy per unit weight and volume by adding additional cells has resulted in overheating at about 45% capacity, as compared to 73% initially. Best energy delivery has been 4.5 watt-hours per pound. (Author)

Division 7 - ELECTRICAL EQUIPMENT

AD-416 131 Div. 7
(TISTM/BRW) OTS price $4.60

Pennsylvania State U., Coll. of Mineral Industries, University Park.
PRELIMINARY INVESTIGATIONS OF POROUS FLOW-THROUGH ELECTRODES OF PLATINUM BLACK,
by P. Palasi and L. G. Austin. May 63, 37p.
RN4
Contract DA49 186 502ORD917
Unclassified report

Descriptors: (*Fuel cells, Electrodes), (*Porous metals, Platinum), Fuels, Oxidizers, Power supplies, Electrolytes, Fluid flow, Electrical properties.

Hafl cell studies were made on four fuels and two oxidants, using a porous flow-through electrode system. The electrode studied consisted of a sandwich of platinum black between platinum screens. The fuels tested were methanol, hydrazine, ammonia and potassium borohydride; the oxidants tested were hydrogen peroxide and nitric acid. All of the reactants were capable of producing current densities of several hundred milliamps/sq. cm at reasonable voltages, but hydrogen peroxide suffered from instability. (Author)

AD-416 164 Div. 7
(TISTE/OHD) OTS price $1.60

Weston Instruments Div., Daystrom Inc., Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR RUGGEDIZED TAUT BAND SUSPENSION PANEL METERS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-43A DATED 15 NOVEMBER, 1960.
Quarterly progress rept. no. 9, 1 Apr-30 June 63. 1 July 63, 11p.
Contract DA36 039SC85952
Unclassified report

Order no. 6007-PP-61-81-81.

Descriptors: (*Meters, Panel boards (Electricity)), Production, Electrical equipment.

To establish facilities and competence to produce ruggedized taut band suspension panel meters in accordance with signal corps requirements. These meters shall have electrical and general performance characteristics currently unobtainable with conventional pivoted military types of indicating meters. (Author)

AD-416 202 Div. 7
(TISTM/AMS) OTS price $15.00

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-11-1-10 AND QUALIFICATION SUPPLEMENT I THEREOF, BATTERY STORAGE, LAUNCH FACILITY,
by K. Niebauer, T. H. Atkinson and W. H. Barton.
1 Feb 63, 1v. Document no. D2 9959 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Storage batteries, Experimental data), Vibration, Shock resistance, Electric insulation, Humidity, High altitude, Temperature, Fungus deterioration, Life expectancy, Performance tests, Data, Specifications, Military requirements, Tests, Test methods, Moisture, Test equipment.

AD-416 245 Div. 7
(TISTM/TLG) OTS price $4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORETICAL PERFORMANCE OF MHD GENERATORS WITH VARIOUS ELECTRODE GEOMETRIES,
by G. W. Sutton. Aug 63, 27p. Rept. no. R63SD62
Contract AF49 638 914
Unclassified report

Descriptors: (*Electric power production, Magnetohydrodynamics), (*Electrodes, Configuration).

The performance of various electrode geometries has been analyzed for MHD generators, assuming scalar electrical conductivity and steady inviscid incompressible flow, with the following results: (a) for electrodes whose height is less than the channel height, the electrode current is reduced, but the open circuit voltage and efficiency are unchanged, as compared to the ideal case, (b) wrapped around electrodes cause internal shorting with a resulting decrease in voltage and efficiency, and (c) finned electrodes cause less internal shorting and loss of efficiency than wrapped around electrodes, and may be of importance in reducing the apparent impedence of segmented electrodes for the case of tensor conductivity. (Author)

AD-416 422 Div. 7
(TISTM/ODN) OTS price $8.10

Texas Instruments, Inc., Dallas.
TECHNICAL SUMMARY REPORT FOR MOLTEN-CARBONATE FUEL BATTERY PROGRAM.
Rept. for 15 Feb-15 Aug 63.
15 Aug 63, 1v. Rept. no. 08 63 108
Contract DA44 009AMC54
Unclassified report

Descriptors: (*Fuel cells, Carbonates), (*Power supplies, Fuel cells), (*Electric power production, Fuel cells), (*Additives, Sodium compounds), (*Carbonates, Fuel cells), Performance (Engineering), Electrolytic cells, Hydrogen, Carbon dioxide, Molybdates, Chromates, Tungstates, Sulfides, Electrodes, Electric currents, Electric potential, Electrolytes, Manufacturing methods, Lithium compounds, Polarization, Batteries and components, Hydrocarbons, Melting, Eutectics, Resistance (Electrical).

Power obtainable from single cells on hydrogen fuel using the 4 3/16 in. electrode diameter assembly has been increased from an average of 60 watts to about 100 watts per square foot at 0.7 volts by improvements in the fuel electrode structure and reduction in electrical resistance. These cells produce approximately 60 watts per square foot at 0.5 volts on a fuel composed of 50:50 hydrogen and carbon dioxide. Cells have operated on the 50:50 hydrogen-carbon dioxide mixture for more than 1,000 hrs. A concentration of 0.2 mole percent of hydrogen sulfide in the fuel gas was found not detrimental in a 1,000 hr test. A 100-watt battery design has been constructed. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-415 663 Div. 8, 6
(TISTE/JWS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELEVATION AND ALTITUDE INDICATORS,
by Sh. Gorin and P. U. Spivak. 11 Apr 63, 16p.
FTD TT63 277 Unclassified report

Trans. from Indikatory Napravleniya, Voyennoye Izdatel'stvo Ministerstva Oborony Soyuza SSR, Moskva, pp. 61-73, 1960.

Descriptors: (*Goniometers, Radar antennas), (*Radar antennas, Antenna radiation patterns), Antenna lobes, Target angle, Target position indicators, Search radar.

AD-415 682 Div. 8
(TISTE/CAM) OTS price $2.60

Microwave Associates Inc., Burlington, Mass.
APPLICATION OF SEMICONDUCTOR DEVICES TO HIGH POWER DUPLEXERS.
Quarterly progress rept. no. 4, 1 Nov 62-31 Jan 63,
by Joseph White. 30 Apr 63, 11p.
Contract AF30 602 2656, Proj. 4506, Task 450602
RADC TDR63 225 Unclassified report

Descriptors: (*Diodes (Semiconductor), Radar duplexers), Limiters, Semiconductor devices, Power, Packaged circuits, Cooling, Water, Microwave frequency, Microwave networks.

Techniques are recommended which show promise for extending the power handling capability of semiconductors when used as duplexers. Semiconductor diodes were made and installed in a special water cooled package intended to combine the low thermal resistance features of the integrated junction, the surface passivation and assembly advantages of the packaged diode. An improved RF circuit was designed which can be used to optimize the high level power capability vs. the low level insertion loss once the number of diodes to be used has been chosen. (Author)

AD-415 691 Div. 8
(TISTM/REB) OTS price $3.60

Hughes Research Labs., Malibu, Calif.
RECEIVERS FOR LASER RADARS.
Interim engineering rept. no. 3, 15 May-14 Aug 63.
14 Aug 63, 27p.
Contract AF33 657 8769, Task 40119
Unclassified report

Descriptors: (*Lasers, Radar receivers), (*Radar receivers, Lasers), (*Noise (Radar), Lasers), Solid state physics, Infrared detectors, Photoelectric effect, Noise, Semiconductor devices, Gases, Xenon, Helium, Photoelectric cells (Semiconductor).

Preliminary gain and noise measurements on a 2-1/4 in. ruby laser amplifier indicate a net gain of 5.5 dB and a spontaneous emission of 1.28 photons per signal mode. Preliminary gain measurements on xenon-helium and xenon gas lasers indicate gains up to 62 dB/m. Further work on noise properties and Zeeman tuning are planned. A detailed study of semiconductor photodetectors was made which indicates that the present response times of the devices are limited by fabrication and packaging techniques and that further work on these problem areas should result in high quantum efficiency, rapid response time, wide bandwidth photodetectors, and photomixers for use at any point of the laser frequency spectrum. (Author)

AD-415 742 Div. 8, 25
(TISTM/AM) OTS price $3.60

Dewey, G. C., and Co., Inc., New York.
AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF RADIATION ON THE PROPAGATION OF ELECTROMAGNETIC SIGNALS IN AIR.
Quarterly progress rept. no. 7, 1 Jan-31 Mar 63,
by M. N. Hirsh and P. N. Eisner. 31 Mar 63, 35p.
Rept. no. R146 7
Contract DA36 039sc87318
Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Radiation effects, Electromagnetic waves), Test equipment, Test methods, Air, Oxygen, Nitrogen, Diffusion, Circuits, Measurements, Equations, Oscillators, Cavity resonators, Pressure, Photographic analysis, Data, Electron density.

The present report covers work performed during the period 1 January to 31 March 1963. It begins with a description of modifications made to the experimental equipment to permit the measurement of time-dependent ionization phenomena. The results of transient measurements in oxygen and N sub 2 - O sub 2 mixtures using these techniques is then presented. A detailed calculation of the role of diffusion in transient ionization phenomena has been started and is discussed in the report. The report closes with a description of the proposed work for the next quarter. (Author)

AD-415 755 Div. 8
(TISTE/OHD) OTS price $2.60

HP Associates, Palo Alto, Calif.
INVESTIGATION OF HOT ELECTRON EMITTER.
Scientific rept. no. 4, 1 Mar-31 May 63.
31 May 63, 16p.
Contract AF19 628 1637, Proj. 4608, Task 460804
AFCRL 63 336 Unclassified report

Descriptors: (*Transistors, Triodes), (*Metal films, Gold), Quantum mechanics, Resistance (Electrical), Gallium compounds, Arsenides, Silicon, Cadmium compounds, Sulfides, Semiconductor devices, Manufacturing methods.

The resistivity of thin gold films on silicon substrates has been studied. The best films were evaporated at pressures less than 10 to the -8th power Torr and on a 200 C substrate. Evidence is presented for some spectral reflection of conduction electrons by the film boundaries. Gold films about 100 Angstroms thick have been prepared with sheet resistance as low as 6 ohms. A hot electron triode with a single crystal GaAs point emitter, a gold base, and a single crystal Si collector is described. This triode exhibits a current transfer ratio alpha of 0.05 over several decades of collector current, and the emitter and collector currents are proportional to exp (q Veb/1.04 kT). A discussion is given of the fabrication of hot electron triodes utilizing an evaporated CdS collector. The techniques of CdS doping and evaporation are described. (Author)

AD-415 758 Div. 8, 26
(TISTE/JBM) OTS price $7.60

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
PRODUCTION REFINEMENT OF Ku-BAND TRAVELING-WAVE TUBES.
Application engineering rept., Feb 60-July 62, by C. W. Linn and M. J. Shepherd. July 62, 1v.
Contract AF33 600 40480, Proj. 7 741
ASD TR63 7 741, vol. 2 Unclassified report

Descriptors: (*Traveling-wave tubes, Microwave amplifiers), (*Microwave amplifiers, Traveling-wave tubes, (*Production, Traveling-wave tubes), K band, Industrial equipment, Airborne, Broadband, Electrical properties, Specifications.

Efforts concerned the production refinement of Ku-band traveling wave tubes. Detailed application information and data for Ku-band traveling-wave tube amplifiers resulting from the production refinement program are given. The purposes of the production refinement program were to electrically and mechanically refine an R&D model tube to make the design suitable for economical volume production, while meeting certain electrical, mechanical, and environmental specifications. The tube is of ruggedized metal ceramic construction which will meet the requirements of airborne system applications under severe environmental conditions. (Author)

AD-415 760 Div. 8, 25
(TISTM/ODN) OTS price $7.60

Electronics Research Lab., U. of Calif., Berkeley.
DC ELECTROLUMINESCENCE IN MANGANESE-ACTIVATED ALUMINUM-OXIDE FILMS,
by L. Spinazze. 11 Sep 62, 64p. Rept. nos. Series no. 60, Issue no. 482 and Scientific rept. no. 21
Contract AF19 628 324, Proj. 5634, Task 563402
AFCRL Rept. no. 63 153 Unclassified report

Descriptors: (*Electroluminescence, Films), (*Aluminum compounds, Oxides), (*Films, Electroluminescence), Semiconductors, Phosphorescent materials, Direct current, Manganese, Surfaces, Cathode ray tubes, Aluminates, Rectifiers, Impurities, Instrumentation, Solutions, Plating, Electrolytes, Spinels, Brightness, Crystal structure, Oxidation, Electric potential, Line spectrum, Crystals, Sodium compounds, Borates.

A semiquantitative investigation of the bright green electroluminescence displayed by manganese-activated aluminum anodic films is presented. Investigation shows that this type of dc electroluminescence does not seem to occur in the 'dry' state, but rather depends upon an aqueous environment. Best results are obtained with a sodium borate electrolyte, but other solutions also produce the effect. A study with other activators reveals that the bright green emission is apparently characteristic of manganese and aluminum oxide. (Author)

AD-415 779 Div. 8, 26
(TISTP/FEM) OTS price $8.60

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
PRODUCTION REFINEMENT OF Ku-BAND TRAVELING-WAVE TUBES.
Final technical engineering rept. Feb 60-July 62, by C. W. Linn and M. J. Sheperd. July 62, 84p.
Rept. no. TIS R62ELM 186 10
Contract AF33 600 40480, Proj. 7 741
ASD TR63 7 741 Unclassified report

Descriptors: (*Traveling wave tubes, Design), (*Electron tubes, Manufacturing methods), K band, Gain, Metals, Ceramic materials, Radiofrequency power, Power amplifiers, Focusing, Solenoids.

This report summarizes the work performed in the production refinement of a three-tube chain whose major requirement is to furnish 1 kw of pulsed RF power across the K sub u band range of frequencies. This work includes the production refinement of each vacuum tube and focusing package, and the establishment of a pilot production line to show the capability of manufacturing these tubes with high yields. The three tubes, designated the ZM-5182, ZM-5183, and ZM-5184, were successfully productized, and sufficient quantities of these were manufactured to demonstrate the successful achievement of both the tube design and the pilot production line. The ZM-5182 is a PPM-focused 150 mw power output tube with a minimum of 30 db saturation gain across the 14 to 18 kMc band. The ZM-5183 is a lightweight solenoid-focused 10 watt CW power output tube with 25 db saturation gain over the 14 to 18 kMc band. The ZM-5184 is a 1 kw minimum, 0.015 duty cycle, traveling-wave tube with 25 db minimum saturation gain across the 14 to 18 kMc band. A production line was established which utilizes the latest in metal and ceramic tube construction techniques, and provides economical fabrication of all three tubes. Complete test consoles were fabricated to perform all RF tests with methods most accurate and least time consuming. (Author)

AD-415 780 Div. 8
(TISTE/OHD) OTS price $1.60

Bell Telephone Labs., Inc., Murray Hill, N. J.
MICROWAVE DIODE RESEARCH.
Quarterly progress rept. no. 4, 10 Mar-9 June 63, by J. C. Irvin. 20 Sep 63, 18p. Rept. no. 13
Contract DA36 039sc89205, Proj. 3A99 21 001
Unclassified report

Descriptors: (*Varactor diodes, Scientific research), X band, Extremely high frequency, Epitaxial growth, Noise (Radio), Microwave amplifiers, Semiconducting films, Gallium compounds, Arsenides.

Improved control over epitaxial film thickness, coupled with refinements in diffusion, contracting, and packaging procedures, has resulted in the development of epitaxial GaAs varactors of unusually high performance. Dynamic quality factors over 14.0 (at 5.85 gc) are routinely achieved with surface barrier models while values around 12 typify the diffused units. For both structures, measured effective noise temperatures are in excellent agreement with the observed dynamic quality factors. The lowest effective noise temperatures observed to date for diffused and surface barrier varactors are 26 K and 20 K respectively (degenerate, double-channel, at 5.85 gc and room temperature). These varactor units, which employ epitaxial films one micron thick and junction diameters of about one mil, typically have a junction capacitance of 0.5 pf, reverse breakdown of 12 volts, and zero-bias wafer cut-off frequency of 300 to 500 gc. (Author)

AD-415 830 Div. 8
(TISTE/OHD) OTS price $6.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
ANTENNA SITING STUDY.
Final rept.,
by B. Popovich. June 63, 1v.
Contract AF19 604 8814, Proj. 4600, Task 460005
AFCRL 63 190 Unclassified report

Descriptors: (*Antennas, Noise (Radio)), (*Noise (Radio), Antennas), (*Antenna radiation patterns, Antenna lobes), Theory, Integral equations, Field theory, Vector analysis, Parabolic antennas, Electromagnetic fields, Electromagnetic waves, Design.

The fundamental factors that can affect the design of a low-noise antenna are discussed. The current-integration method for obtaining the antenna radiation pattern is shown to reveal the nature of the wide-angle side lobes and the radiation fields existing in the shadow region of the antenna. The diffraction fields can be disregarded in the design of large, low-noise ground-based antennas (D >> 10 lamda). Some of the effects are experimentally verified. (Author)

AD-415 844 Div. 8
(TISTE/OHD) OTS price $4.60

Aircraft Armaments Inc., Cockeysville, Md.
FOUR-CHANNEL AMPLIFIER ASSEMBLY.
Final rept., Feb-Dec 62.
June 63, 44p.
Contract FAA ARDS491, Proj. 111 2
Unclassified report

Descriptors: (*Audio amplifiers, Transistor amplifiers), Automatic gain control, Design, Transients, Power supplies, Bandwidth, Noise (Radio), Wiring diagrams.

The result of the work was delivery of five prototype units of a high-reliability four-channel transistorized audio amplifier assembly. Each assembly houses four independent amplifier modules with a frequency response from 300 to 3000 cycles per second and a gain of 88 db. The assembly also contains two redundant power supplies in the 7 high standard relay panel. The amplifiers met all the requirements of the specification. The two most difficult problems consisted of maintaining the regulated output (AGC) attack and recovery time for input signal level changes over the temperature range, and designing the dynamic response circuit. The dynamic response feature which essentially restricted the amplifier bandwidth under zero input signal conditions was to be included if proved feasible and at the same time did not affect the other characteristics of the amplifier. It was proved unfeasible after extensive tests were performed, and it was proved to have a strong interaction with the AGC action. It was therefore not included in the amplifier design. (Author)

AD-415 846 Div. 8, 26
(TISTE/OHD) OTS price $8.60

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS.
Quarterly progress rept., 31 Jan-30 Apr 63.
Apr 63, 1v.
Contract DA36 039sc86724
Unclassified report

Descriptors: (*Transistors, Production), (*Manufacturing methods, Transistors), Germanium, Surface properties, Oxidation, Organic coatings, Humidity, Tests, Soldering, Helium.

Life test results are discussed for transistors on which surface passivation by oxidation was attempted. Results are discussed on surface passivation by organic coats according to the new procedure. Results are presented for humidity testing of pre-capped units. Results on the use of molecular sieve and calcium sulphate are discussed. Methods of improving soldering of the new clip are outlined. The program involving 10 mil collectors is presented. Program on the new tray, clip blower and hand tester is presented. The helium leak detector is now in operation on a 100% basis. Results on reliability measurements of transistors are presented. (Author)

AD-415 851 Div. 8
(TISTP/FEM) OTS price $7.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MODAL ANALYSIS AND SYNTHESIS OF ELECTROMAGNETIC FIELDS,
by L. B. Felsen and N. Marcuvitz. 14 Nov 62, 1v.
Rept. no. PIBMRI1083 62
Contract AF19 604 7499, Proj. 4600, Task 460004
AFCRL 63 76 Unclassified report

Descriptors: (*Electromagnetic fields, Synthesis), (*Waveguides, Cylindrical bodies), Wedges, Radio waves, Propagation, Models (Simulation), Green's functions, Equations, Trigonometry, Integrals, Diffraction, Electromagnetic waves, Radiators, Electric currents, Transmission lines, Electrical networks, Sources, Reflection.

Waveguide cross sections which are partially bounded are discussed. The effect of waveguide walls whose location is describable simply in terms of a circular cylindrical coordinate system is investigated; including the important configurations of the circular cylinder and the wedge. (Author)

AD-415 869 Div. 8
(TISTE/JWS) OTS price $2.60

Electronic Communications Inc., Timonium, Md.
INVESTIGATION OF IMPROVED AIRBORNE ANTENNA TECHNIQUES FOR COMBAT SURVEILLANCE.
Quarterly progress rept. no. 4, 1 Mar-31 May 63,
by Marvin Cohn and Robert S. Littlepage.
28 June 63, 21p.
Contract DA36 039sc90750, Proj. 1G6 20901A040 01
Unclassified report

Descriptors: (*Slot antennas, Coupled antennas), (*Coupled antennas, Slot antennas), Antenna radiation patterns, Measurement, Waveguides, Extremely high frequency, Polarization, Mathematical prediction, Field theory, Electromagnetic waves, Airplane antennas, Electromagnetic warfare.

A 10 x 2 element surface wave excited slot array was designed, based on single slot data, to have a constant amplitude illumination. Pattern measurements in both the E and H planes are in very good agreement with the predicted patterns. Mutual coupling was not a problem in this small array. This initial array plate was inverted, resulting in an exponentially illuminated 10 x 2 element array. Here the measured pattern was not in good agreement with the pattern determined by analysis. A possible explanation is given. An exponential taper to

a thin dielectric tape was investigated and resulted in a more efficient transition from a tight to a loosely bound surface wave within the trough waveguide. Using this improved taper, fields of high purity extend to heights of at least eighteen wavelengths. (Author)

AD-415 870 Div. 8
(TISTE/JWS) OTS price $8.10

General Electric Co., Syracuse, N. Y.
HARDENED POINT-TO-POINT COMMUNICATION ANTENNA CONFIGURATIONS. VOLUME II.
Final rept.,
by W. T. Whistler, J. W. Stauffer, K. G. Schroeder, R. C. Roden and L. H. Dee. May 62, 82p. Rept. no. G.E. R62EMH23
Contract AF19 604 7469, Proj. 4600, Task 460007
AFCRL 62 339, vol. 2 Unclassified report

Descriptors: (*Antenna configurations, Radio communications systems), (*Coupled antennas, Vulnerability), Very high frequency, Ultra-high frequency, Test equipment (Electronics), Measurement, Antenna radiation patterns, Equations, Matrix algebra.

A study has been conducted to determine the relative hardenability of various antenna designs in the 100-1000 Mc band. Circularly symmetric and point-to-point communication antennas were investigated. The design and hardenability of circularly symmetric arrays (e. g. elements in ring and star shaped configurations) was investigated. The use of scattering matrices in the measurement of mutual coupling is presented. (Author)

AD-415 871 Div. 8
(TISTE/JWS) OTS price $8.10

Minneapolis-Honeywell Regulator Co., Hopkins, Minn.
LOW INPUT VOLTAGE CONVERSION.
Quarterly progress rept. no. 2, 1 Oct-30 Dec 62,
by John T. Lingle. 14 July 61, 1v.
Contract DA36 039sc90808, Proj. 3A99 09 001
Unclassified report

Descriptors: (*Inverters, Transistors), (*Transistors, Inverters), (*Magnetohydrodynamics, Power supplies), Low pass filters, Oscillators, Pulse generators, Feedback, Rectifiers, Tests, Test methods, Hydraulic systems, Effectiveness, Wiring diagrams.

Investigative effort was concentrated on the literature search, the transistor approach, the electromechanical approach, and the dc to dc magnetohydrodynamic approach. The major effort was concentrated on the transistor approach and the magnetohydrodynamic approach. Work on the transistor approach was directed toward circuit design, transformer and reactor design, transistor parameter measurements, parts procurement, and breadboard fabrication. The breadboard is near completion and ititial checkout of the various circuit sections is underway. The transistor converter design should provide optimum drive to the power amplifier transistors. The design switches the transistors rapidly with a large current pulse and then provides current feedback drive proportional to load current which maintains transistor operation in the saturation region. This feature should minimize transistor drive, switching losses, and saturation losses. Driven transistors are also used in the rectification circuit in places of diodes. The forward drop across the transistor driven to saturation is less than half that of a silicon rectifier. It is anticipated that the transistor drive loss plus the saturation loss will be considerably less than that of a rectifier, and consequently, this uheme should improve efficiency. Another advantage is that this rectification scheme may be adaptable to pulse width modulation. (Author)

AD-415 928 Div. 8, 19
(TISTE/CAM) OTS price $2.60

Bendix Corp., York, Pa.
DESIGN AND DEVELOPMENT OF THE MODULAR MONITOR SYSTEM INDICATORS.
Final rept.
May 63, 21p. Rept. no. P372R
Contract ARDS614, Proj. 113 14
Unclassified report

Descriptors: (*Monitors, Remote control systems), (*Remote control systems, Navigational aids), (*Air traffic control systems, Monitors), Panel boards (Electricity), Design, Packaged circuits, Modules (Electronics), Semiconductor devices, Performance tests, Switching circuits, Test methods, Wiring diagrams.

Effort is presented to design and develop a modular system to be used by airport Flight Service Stations for monitoring NAVAID equipment. The design objective has been to create equipment which can readily be adapted to the needs and growth of any Flight Service Station without waste of parts or space. During the design phase of the project, the contractor made studies of existing monitoring equipment and external wiring configurations. The modular design approach has been based upon separation of the functions common to all navigational facilities and the repetitive functions necessary for monitoring and control of each site. The repetitive functions are packaged into plug-in modules, each module representing one monitored equipment at a site. The common functions are grouped separately in a portion of the main panel. Reductions in equipment size were made possible by the introduction of smaller switch-indicators and semiconductor devices powered by a low voltage power supply. All components have been evaluated for performance and maintenance-free operation, and the final product thoroughly tested. (Author)

AD-415 937 Div. 8
(TISTE/OHD) OTS price $4.60

Microwave Associates, Inc., Burlington, Mass.
SOLID-STATE S AND X BAND LIMITERS.
Final rept., 30 Mar 62-30 May 63,
by Robert Tenenholtz. 18 July 63, 45p.
Contract NObsr87307, Proj. SR0080301
Unclassified report

Descriptors: (*Limiters, Semiconductor devices), (*Diodes (Semiconductor), S band), X band, Varactor diodes, Radiofrequency power, Theory, Circuits, Electrical impedance, Electrical conductance, Microwave networks, Switching circuits.

Final design and testing for both S and X band PN-junction limiters was completed. In each case, paralleling of two limiters is employed to achieve power handling capabilities of 10 and 2 kw peak for S and X band respectively. A brief review of basic PN-junction diode theory, limiter circuit design and other pertinent areas is presented. Concluding the summarized presentation in this report is final test data on the limiter units along with conclusions based on information secured during the overall program effort. (Author)

AD-415 941 Div. 8, 17
(TISTE/JBM) OTS price $1.60

South Dakota School of Mines and Technology, Rapid City.
HIGH-TEMPERATURE THERMAL CONDUCTIVITY MEASUREMENTS IN SEMICONDUCTORS.
Status rept., 1 June-31 Aug 63,
by Robert G. Morris. 31 Aug 63, 13p.
Contract Nonr2964 01, Proj. NR017 208
Unclassified report

Descriptors: (*Semiconductors, Thermal conductivity), (*Thermal conductivity, Semiconductors), High temperature research, Indium alloys, Antimony alloys, Measurement, Impurities, Crystal lattices, Magnetic fields, Electric currents, Transport propertids, Tellurium alloys, Sulfur, Bismuth alloys.

Efforts concerned the measurement of the contact and bulk thermal conductivities of semiconductors at temperatures above room temperature by means of the series comparative method. Measurements of thermal conductivity K of highly-doped p-type InSb were completed. Results on three samples are given. Calculations of the approximate thermal resistivities limited by lattice Umklapp scattering and by impurities are presented. A series comparison method was employed in measuring thermal conductivity and effects of a magnetic field on transport properties of one sample of TiTeS and on three heavily doped samples of p-type InSb. (Author)

AD-415 952 Div. 8
(TISTE/OHD) OTS price $10.50

General Electric Co., Auburn, N. Y.
THE RESEARCH AND DEVELOPMENT OF HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
Final rept., 30 June 62-30 June 63.
30 June 63, 1v.
Contract NObsr87648, Proj. SF013 11 05
Unclassified report

Descriptors: (*Crystal rectifiers, Silicon), (*Electronic switches, Semiconductor devices), Electric currents, Electric potential, Time, Test equipment (Electronics), Theory.

This final report covers the research and development conducted to obtain high-current and high-voltage silicon controlled rectifiers. The development, design, optimization, fabrication and characterization of device B are described and discussed in detail. Processes and component parts are also described herein. (Author)

AD-415 954 Div. 8
(TISTP/FEM) OTS price $5.60

Rocketdyne, Canoga Park, Calif.
SOME RESULTS ON DESIGNS FOR REGRESSION EXPERIMENTS, DESIGN OF EXPERIMENTS WITH AUTOCORRELATED ERRORS PRESENT, AND DECISION THEORY APPROACH TO COMPLEX EXPERIMENTATION,
by M. J. Alexander, N. R. Goodman, M. O. Locks and S. R. Webb. June 63, 55p.
Contract AF33 616 7372, Proj. 7071, Task 7071 01
ARL 63 107 Unclassified report

Report on Mathematical Techniques of Aeromechanics.

Descriptors: (*Reliability, Experimental data), (*Experimental data, Design), Dynamic programming, Equations, Partial differential equations, Sequences, Simulation, Polynomials, Signals, Correlation techniques, Costs, Statistical analysis, Mathematical models, Optimization.

Results of research conducted in the statistical design of complex experimental programs are reviewed. Included are discussions of the loss function methods for determining regression designs to minimize cost and variance, the design of experiments with autocorrelated errors and applications of decision theory and dynamic programming to the design of reliability growth programs. (Author)

AD-415 981 Div. 8
(TISTE/JBM) OTS price $2.60

Hoffman Electronics Corp., Los Angeles, Calif.
DEVELOPMENT AND FABRICATION OF ANTENNA GROUP AN/GRA.
Quarterly progress rept. no. 1, 1 Jan-1 Apr 63,
by F. C. Carpenter. 1 Apr 63, 29p.
Contract DA36 039sc90847, Proj. 2254 02 001
Unclassified report

Descriptors: (*Omnidirectional antennas, Ground vehicle antennas), Medium frequency, High frequency, Hydraulic systems, Tests, Environmental tests, Weight, Mobile, Helixes, Antenna masts, Ground (Electrical), Impedance matching, Band-pass filters.

Research concerns the design and development of an efficient antenna system for the antenna group AN/GRA which includes a tunable omnidirectional antenna capable of operating in the frequency range 1.5 to 20 mc, handling 2500 watts of average power, and receiving weak signals. Tests for developing a suitable counterpoise ground system are described. Evaluation of the counterpoise ground system and whip antenna in the field is covered. Some aspects of the hydraulic system are discussed, and environmental tests of its performance are described. Tabulation of major system components and their weights is covered. (Author)

AD-415 997 Div. 8, 32, 30
(TISTE/CAM) OTS price $4.60

New York U. Coll. of Engineering, N. Y.
PROJECTS DEALING WITH ADVANCED ELECTRON DEVICE TECHNOLOGY.
June 63, 39p. Status rept. no. 75
Contract DA36 039sc89076
Unclassified report

Descriptors: (*Electronic equipment, Scientific research), (*Bibliographies, Electronic equipment), Microwave equipment, Electron tubes, Reliability (Electronics), Life expectancy, Amplifiers, Semiconductor devices, Circuits, Microminizturization (Electronics), Traveling wave tubes.

AD-416 020 Div. 8, 25
(TISTP/FEM) OTS price $10.10

Electron Physics Lab., U. of Michigan, Ann Arbor.
APPLIED RESEARCH IN MICROWAVE AND QUANTUM ELECTRONICS.
Interim scientific rept. no. 3, 5 Feb-5 June 63,
by J. E. Boers, H. K. Detweiler, G. I. Haddad, G. Hok and G. T. Konrad. 5 June 63, 113p. Rept. no. 05000 7S
Contract AF33 657 8050, Proj. 4856, Task 415603
Unclassified report

Descriptors: (*Electromagnetic waves, Plasma medium), (*Electron guns, Electron beams), (*Materials, Thermal conductivity), Microwave frequency, Electron tubes, Helixes, Beryllium compounds, Oxides, Space charges, Trajectories, Plasma oscillations, Electron density, Focusing, Masers, Traveling wave tubes, X band, Cerenkov radiation.

This report summarizes research on the general program of applied research in microwave and quantum electronics. All the investigations carried out are directed toward extending the state of the art in microwave and quantum electronics. The research is theoretical as well as experimental in nature. The theoretical work is largely devoted to an investigation of low-noise phenomena and beam-plasma interactions. The experimental work is concerned with electromagnetic generation, particularly in the short wavelength regions. This includes several plasma devices, masers, and a Cerenkov radiation device. In addition, crossed-field electron guns and high-thermal-conductivity dielectric materials for high-average-power microwave tubes are studied from a theoretical as well as experimental point of view. (Author)

AD-416 060 Div. 8
(TISTE/OHD) OTS price $8.60

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
PRODUCTION REFINEMENT OF Ku-BAND TRAVELING-WAVE TUBES.
Final technical engineering rept., Feb 60-July 62,
by C. W. Linn and M. J. Shepherd. July 62, 85p.
Rept. no. TIS R62ELM186 10
Contract AF33 600 40480, Proj. 7 741
ASD TR63 7 741, vol. 1 Unclassified report

Descriptors: (*Traveling wave tubes, K band), (*Microwave amplifiers, Manufacturing methods), Production, Focusing, Magnets, Circuits, Bandwidth, Electron tube parts, Temperature, Gain.

The purpose of this report is to summarize the work performed in the production refinement of a three-tube chain whose major requirement is to furnish 1 kw of pulsed RF power across the Ku-band range of frequencies. This work includes the production refinement of each vacuum tube and focusing package, and the establishment of a pilot production line to show the capability of manufacturing these tubes with high yields. Sufficient quantities of the three tubes were manufactured to demonstrate the successful achievement of both the tube design and the pilot production line. The ZM-5182 is a PPM-focused 150 mw power output tube with a minimum of 30 db saturation gain across the 14 to 18 kMc band. The ZM-5183 is a lightweight solenoid-focused 10 watt CW power output tube with 25 db saturation gain over the 14 to 18 kMc band. The ZM-5184 is a 1 kw minimum, 0.015 duty cycle, traveling-wave tube with 25 db minimum saturation gain across the 14 to 18 kMc band. All three tubes were tested to meet the full RF specifications. (Author)

AD-416 191 Div. 8, 14, 26
(TISTM/BRW) OTS price $1.60

Bendix Radio Div., Bendix Corp, Baltimore, Md.
ML-419 THERMISTOR P.E.M.
Quarterly progress rept. no. 2, 1 Apr-30 June 63,
by J. T. George. July 63, 16p.
Contract DA36 039amc01465E
Unclassified report

Descriptors: (*Ceramic materials, Processing), (*Thermistors, Material forming), Automation, Manufacturing methods, Industrial equipment, Soldering fluxes, Soldering, Coatings, Paint applicators, Clay, Radiosondes.

Progress is reported of activities on the improvement of the quality and processing facilities of the Signal Corps ML-419 Thermistor Sensor for Radiosonde use. (Author)

AD-416 236 Div. 8
(TISTE/JWS) OTS price $1.75

Harry Diamond Labs., Washington, D. C.
SMALL SIGNAL PROPERTIES OF TWO MINIATURE MICROWAVE DIODES,
by William L. Soper. 8 July 63, 73p.
Proj. A0200
HDL Rept. no. TR1140 Unclassified report

Descriptors: (*Diodes (Semiconductor), Crystal detectors), (*Crystal detectors, Electrical properties), Direct current, Measurement, Test methods, Electrical impedance, Radiofrequency, Sensitivity, Mathematical models, Standing wave ratios, Test equipment (Electronics).

The properties of two types of recently introduced miniature microwave diodes are investigated. Three type 1N830 diodes and two type 1N833 diodes are evaluated for low level video detector applications. The diodes are compared with respect to their static characteristics, their r-f impedances, and their tangential signal sensitivities. High frequency equivalent circuits are derived and compared to the experimental results obtained for each sample. (Author)

AD-416 249 Div. 8, 6
(TISTM/TCG) OTS price $2.60

Hughes Research Labs., Malibu, Calif.
RECEIVERS FOR LASER RADARS.
Interim engineering rept. no. 1, 15 Nov 62-14 Feb 63,
by R. L. Forward. 15 Feb 63, 22p.
Contract AF33 657 8769, Task 40119
Unclassified report

Descriptors: (*Lasers, Preamplifiers), (*Radar receivers, Doppler radar), Optical scanning, Detection, Optical phenomena, Radiation measurement system, Quantum mechanics, Theory, Signal-to-noise ratio, Attenuation, Photons, Cathodes.

The objective of this work is to investigate theoretically and experimentally the properties of a laser preamplifier for an optical Doppler radar receiver. In order to ascertain the fundamental limitations of various methods of detecting or amplifying optical radiation, a comprehensive literature search was undertaken to include all important papers on the quantum theory of noise and quantum mechanical amplifiers. For comparison of the various types of receivers, a particular method was chosen for describing the signal and calculating the uncertainties introduced and was applied uniformly to all the different systems. The signal-to-noise ratios of an optical signal were calculated after attentuation in a transmission medium and after amplification by four different systems (a photodetector, a single mode laser amplifier, a single mode optical heterodyne, and a laser preamplifier followed by an optical heterodyne). It was found that an amplifier must be used before the signal becomes too weak (average number

of received photons approaches unity) or information will be irretrievably lost. If the system parameters indicate this will happen, a laser amplifier should be used in front of the transmitter (assuming the power handling capabilities are available). (Author)

AD-416 268 Div. 8, 25
(TISTM/AMS) OTS price $2.60

Westinghouse Electric Corp., Dayton, Ohio.
500 DEGREES C SILICON CARBIDE RECTIFIER PROGRAM.
Interim technical progress rept. no. 7, 1 Apr-30 June 63.
30 June 63, 26p.
Contract AF33 657 7027, Proj. 7 727
Unclassified report

Descriptors: (*Silicon compounds, Carbides), (*Rectifiers, Crystals), Mathematical models, Laboratory furnaces, Manufacturing methods, Crystal growth, Control, Epitaxial growth, Etched crystals.

The basic objective of this project is the development of methods for the production of 1 ampere silicon carbide rectifiers. An additional goal is to obtain more basic knowledge regarding crystal growth and junction formation, while at the same time improving the product. For some time empirical methods have been employed in the crystal growth and junction formation phases of this program. This empirical treatment was felt necessary, as many experimental investigations yielded contradictory results when performed on different occasions. However, in this past period, calculations have been made on a simple model of crystal growth, and quantitative values have been used to check experimental data. Good correlation has been obtained between the model and the observed results, and even better correlation is expected when new data is available. From these results several new ideas have arisen for the preparation of SiC crystals of a given size and for increasing the yield of usable crystals. (Author)

AD-416 288 Div. 8
(TISTE/OHD) OTS price $3.60

Sperry Gyroscope Co., Great Neck, N. Y.
DEVELOPMENT OF AN ELECTRON BEAM DUPLEXER.
Quarterly progress rept. no. 1, 1 Mar-31 May 63,
by I. Itzkan and A. Roemer. July 63, 1v.
Rept. no. NA8210 8352 1
Contract DA36 039AMC02174, Proj. 1G6 22001A055 04
Unclassified report

Descriptors: (*Radar duplexers, S Band), (*Electron beams, Radar duplexers), (*Electron tubes, Radar duplexers), Electromagnetic waves, Helixes, Coupling circuits, Broadband, Propagation.

An S-band electron geam duplexer was designed, fabricated, and its assembly 90-percent completed by 31 May 1963. No unforeseen difficulties were encountered during this initial phase. It is expected that testing of the first S-band device will be accomplished in the second quarter, and that the results of these tests will provide suitable data to re-design an improved version, and to initiate its fabrication. Appended to this report is a discussion of the test results obtained from the C-band device which served as a guideline for producing the first S-band design emanating from this program. (Author)

AD-416 386 Div. 8, 30
(TISTE/OHD) OTS price $1.10

Arizona U., Tucson.
AN INTERPOLATION WAVEFORM GENERATOR FOR USE IN HYBRID COMPUTING SYSTEM,
by John V. Wait. 11 Feb 63, 6p. Memo. no. 64
AFOSR 5180 Unclassified report

Descriptors: (*Waveform generators, Digital differential analyzers), Integrators (Computers), Computers.

The following paper describes a precision sawtooth generator for use in generating interpolation waveforms for use in hybrid (parallel analog-digital) differential analyzer systems. The circuit generates positive and negative ramps, which have an initial value of zero and a final value of 10 volts. The ramp time interval is controlled by the choice of integrating capacitor and external drive signal, and is nominally 1250 microseconds. The output waveforms are reset to zero within 20 mv. The resetting time is proportional to the required ramp interval, and is about 25 microseconds for a 1250 microsecond ramp time. The prototype unit will drive a load of 680 ohms in parallel with 0.01 mfd., without any noticable change in the output waveform. (Author)

AD-416 396 Div. 8
(TISTE/OHD) OTS price $1.60

General Electric Co., Syracuse, N. Y.
SEMICONDUCTOR DEVICE CONCEPTS.
28 June 63, 9p. Scientific rept. no. 4B
Contract AF19 628 329, Proj. 4608, Task 460804
AFCRL 63 323, vol. 4b Unclassified report

Descriptors: (*Semiconductor devices, Manufacturing methods), Halogens, Crystal growth, Gallium alloys, Arsenic alloys, Phosphorus alloys, Electron transitions.

Some further experience and problems with contamination encountered in halogen vapor synthesis of Ga(As(1-x) P(x)) crystals are described. The possibility of oxygen contamination of Ga(As(1-x) P(x)) during vapor synthesis is discussed. Some experiments which bear upon the direct-indirect transition and lower wavelength possibilities of Ga(As(1-x) P(x)) are described. (Author)

AD-416 437 Div. 8, 25
(TISTP/TL) OTS price $5.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
SCATTERING RESONANCES ON A FAST-WAVE STRUCTURE,
by Robert C. M. Li. June 63, 49p. Research rept. no. PIBMRI1156 63
Contract AF19 604 7499, Proj. 4600, Task 460004
AFCRL 63 151 Unclassified report

Descriptors: (*Waveguides, Scattering), (*Electromagnetic waves, Propagation), Wave transmission, Resonance, Reflection, Polarization, Diffraction.

The scattering resonances, or generalized Wood's anomalies, that are exhibited on a fast-wave structure are investigated. The fast-wave structure analyzed here in detail consists of a parallel-plate waveguide perturbed by a series of periodic, parallel slits in the top plate. In the range a/gamma < 1/2, the plane wave scattering problem is considered for both E and H mode polarizations, and the anomalies are found to manifest themselves as a rapid variation in the phase of the reflection coefficient. When a/gamma

< 1/2, there are no higher order diffracted waves, and the magnitude of the reflection coefficient is therefore fixed at unity. The relative periodicity is next extended to the range 1/2 < a/gamma < 1, and the scattering problem considered for E mode polarization. The periodicity is now such that both the reflected wave and the first higher order diffracted wave propagate transversely. Under such circumstances, it is convenient to use a scattering description for the fields, and the anomalies may then be observed as rapid variations in both magnitude and phase of the scattering coefficients. (Author)

AD-416 456 Div. 8
(TISTP/FEM) OTS price $2.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
ASSIGNING MEASUREMENTS TO TELEMETRY CHANNELS TO MEET ERROR SPECIFICATIONS,
by W. F. Baxter and C. F. Asquith. 22 July 63, 17p.
Proj. 1A2 22901A202
AMC RA Rept. no. RG TR63 13
Unclassified report

Descriptors: (*Telemetering data, Data transmission systems), (*Telemeter systems, Bandwidth), (*Filters (Electromagnetic wave), Performance (Engineering)), Frequency modulation, Costs, Weight, Signals, Errors.

An aid is presented for determining the telemetry channel to which a measurement should be assigned to meet error specifications. The ramp responses of several telemetry filters are determined, and the results are extended to cover other filters and other functions. (Author)

AD-416 468 Div. 8
(TISTE/OHD) OTS price $5.60

Texas U., Austin.
ANTENNA AND RADIO WAVE PROPAGATION CHARACTERISTICS AT VHF NEAR AND IN THE GROUND,
by Douglas M. Schwartz. Aug 63, 45p.
Unclassified report

Master's thesis.

Descriptors: (*Propagation, Earth), (*Very high frequency, Lithosphere), (*Dipole antennas, Ground (Electrical)), Antenna radiation patterns, Radio fields, Radio waves, Electrical conductance, Electrical impedance, Soils, Terrain, Field theory, Mathematical analysis.

The radiation pattern and radiation impedance of a half wavelength dipole at VHF, in and near the ground, have been measured and are reported here. The variation of the field strength of VHF signals, in and near the ground, have been measured and are reported. Good correlation was found between the measured and theoretical radiation patterns and field strength variation for above ground conditions. Theoretically, for the same incident field strength, a larger signal is found for a few feet below the surface of the ground at VHF than at 1.0 mc/s. The difference in the attenuation and transmission characteristics at these frequencies account for this. Large variations in the field strength occur for various soil conditions at any given depth. The half wavelength dipole appears to be acceptable as an antenna for underground reception, although it does suffer a large loss in capture area when cut to the proper length for local ground conditions. It appears that a better antenna system than the unshielded dipole used in this study is desirable if one is to take advantage of the available field strength, at VHF, below the earth's surface. (Author)

AD-416 494 Div. 8
(TISTE/OHD) OTS price $10.10

Arinc Research Corp., Washington, D. C.
SYSTEM RELIABILITY PREDICTION BY FUNCTION. VOLUME 1. DEVELOPMENT OF PREDICTION TECHNIQUES.
Technical documentary rept., 27 July-27 Apr 63.
Aug 63, 115p. Rept. no. 241 01 1 375
Contract AF30 602 2838, Proj. 5588, Task 558802
RADC TDR63 300, vol. 1 Unclassified report

Descriptors: (*Reliability (Electronics), Mathematical analysis), (*Mathematical prediction, Electronic equipment), Programming (Computers), Analysis, Experimental data, Radar equipment, Radio equipment.

A technique was developed for predicting the reliability of ground electronic systems prior to the actual design of the systems. Reliability data from 51 systems representing over two million system operating hours were analyzed to develop prediction equations based on generalized system parameters such as complexity, power consumption, and frequency. The prediction equations are of the form Ln theta = bo + b1X1 + b2 X2 ... + bnXn, where theta is the predicted system mean life and the Xi are measures of equipment characteristics. The coefficients bi were determined by multiple regression analysis. Approximately 40 possible characteristics were investigated. The technique also allows the estimation of confidence intervals for Ln theta. With the use of new data, the prediction technique can be updated at any time by the computation of new regression equations. The required program (1401 computer, FORTRAN) is presented in an appendix. The step-by-step procedure is presented in Volume II of this report. (Author)

9. FLUID MECHANICS

AD-415 643 Div. 9
(TISTP/JP) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BOUNDARY LAYER ON A SLIGHTLY WAVY-SURFACED WALL,
by I. P. Soprunenko. 17 Apr 63, 7p.
FTD TT63 220 Unclassified report

Trans. from Izvestiya AN SSSR Otdeleniye Tekhnicheskikh Nauk-Mekhanika i Mashinostroyeniye, no. 2, pp. 131-133, 1962.

Descriptors: (*Curved profiles, Boundary layer), (*Boundary layer, Curved profiles), Gas flow, Potential theory.

Solutions are discussed for the flow of a gas along a wavy wall with a sinusoidal surface with the amplitude of the wave very small in comparison with the length of the wave. (Author)

AD-415 644 Div. 9
(TISTP/JP) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONSECUTIVE OPERATION OF GAS EJECTORS UNDER STEADY-STATE CONDITIONS,
by I. G. Portnov and G. A. Zotov. 3 Apr 63, 21p.
FTD TT63 184 Unclassified report

Trans. from Razrabotka i Ekspluatatsiya Gazovykh Mestorozhdeniy, Transport Gaza. Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Neftyanoy i Gorno-Toplivnoy Literatury, Moscow, pp. 267-284, 1959.

Descriptors: (*Jet pumps, Cascade structures), Gas flow, Pressure, Nomographs.

Where the pressure of the mixture created by one ejector is insufficient the principle of multistage consecutive ejection is of interest. The following problems are examined: determination of the resultant coefficient of ejection and resultant pressure; determination of the ejector dimensions and operating parameters at a given resultant coefficient of ejection and resultant pressure; determination of the dimensions of one stage of consecutive ejection when the dimensions of the other stage and one of the resultant parameters (resultant coefficient of ejection or resultant pressure) are given. (Author)

AD-415 655 Div. 9
(TISTP/JP) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTERACTION BETWEEN A SHOCK WAVE IN AN ELASTO-PLASTIC MEDIUM AND A NONRIGID WALL,
by G. M. Lyakhov and N. I. Polyakova. 26 Apr 63, 14p.
FTD TT63 360 Unclassified report

Trans. from Zhurnal, Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No. 5, pp. 89-95, Sep-Oct 1962.

Descriptors: (*Shock waves, Reflection), (Sheets, Stresses), Energy, Velocity, Plasticity, Deformation, Elasticity.

The interaction between a wall and a wave in an elasto-plastic medium with an alternating sign of curvature of the stress-strain dependence sigma = sigma(eta) was examined earlier (1). The case of small stresses lying on the concave section of the diagram sigma = sigma(eta), when the wave has no pressure jump at the front, has been investigated. Below, based on earlier studies (1, 2), we will give a solution to the problem of the interaction between a plane wave and a nonrigid wall or the boundary of media in the case of large stresses, corresponding to the section of the diagram sigma(eta) which is convex relative to axis eta. Here the wave is a shock wave. (Author)

AD-415 661 Div. 9, 1
(TISTP/MFA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DIFFUSER OF AERODYNAMIC UNIT - PLANE, REGULABLE, WITH ROTARY PANELS,
by N. Ya. Karpov and A. S. Netylev. 18 Apr 63, 4p.
FTD TT63 286 Unclassified report

Trans. from Russian Patent no. 143658, (Appl. No. 725386/40-23, 8 Apr 1961), pp. 1-2, 1961.

Descriptors: (*Diffusers, Design), Aerodynamic characteristics, Rotating bands, Rings.

AD-415 664 Div. 9
(TISTM/TLG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
USE OF THE SMALL PERTURBATIONS METHOD TO CALCULATE NONADIABATIC FLOW AROUND A FLAT PLATE USING A SUPERSONIC FLOW OF IDEAL GAS,
by I. F. Shakhnov. 24 Apr 63, 8p.
FTD TT63 165 Unclassified report

Trans. from Mekhanika i Mashinostroyeniye, no. 6, pp. 37-41, 1961.

Descriptors: (*Flat plate models, Supersonic characteristics), (*Aerodynamic heating, Mathematical analysis), Aerodynamic characteristics, Supersonic flow.

AD-415 679 Div. 9, 25
(TISTP/MFA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINING FRICTION CHARACTERISTICS IN A TWO-DIMENSIONAL LAMINARY COMPRESSIBLE BOUNDARY LAYER AT HIGH TEMPERATURES AND ZERO PRESSURE GRADIENT,
by I. I. Suksov. 8 Apr 63, 14p.
FTD TT63 90 Unclassified report

Trans. from Aviatsionnaya Tekhnika, Izvestiya VUZ, No. 1, pp. 19-31, 1962.

Descriptors: (*Laminar boundary layer, Compressible flow), (*Friction, Analysis), Gases, High-temperature research, Nonlinear differential equations, Pressure, Thermodynamics, Sheets, Physical properties, Dissociation.

AD-415 701 Div. 9, 25
(TISTP/JP) OTS price $5.60

Michigan U., Ann Arbor.
ENERGY ADDITION TO A FLOWING GAS BY HIGH-REPETI-

TION-RATE, ARRESTED-BREAKDOWN DISCHARGES.
Interim technical rept.,
by H. C. Early and F. J. Martin. Mar 63, 50p.
Contract AF33 616 7243, Proj. 7116, Task 7116 02
ARL 63 54 Unclassified report

Descriptors: (*Gas flow, Gas discharges), Glow discharges, Plasma medium, Energy, Supersonic flow, Subsonic flow, Magnetohydrodynamics, Electrodes, Direct current, Enthalpy, Ionization.

When a steep-front impulse voltage is applied to a pair of corona-type electrodes, a current of several thousand amperes will flow through the gas for a period of 10 to the -8th to 10 to the -7th power second before spark streamer formation takes place. If the voltage is removed quickly enough and the duration of current flow is short enough, several joules of energy can be delivered to an atmospheric-density gas in a single suppressed-breakdown pulse. By using pulse repetition rates of several thousand per second, several kilowatts of electrical power can be delivered to a subsonic or supersonic gas stream by a single set of electrodes. Compared to arc-heating methods, the pulsed-corona discharge is diffuse and uniform and the gas flow remains much more homogeneous. In addition to possible wind-tunnel-air-heating applications, the process may be useful for MHD and other research requiring a non-equilibrium gas having substantial ionization and conductivity at room temperature. (Author)

AD-415 727 Div. 9, 18
(TISTP/TL) OTS price $2.60

Princeton U., N. J.
REVIEW AND ANALYSIS OF THE STATE OF FEDERALLY SPONSORED GROUND EFFECT RESEARCH,
by C. D. Perkins. July 59, 24p.
Unclassified report

Descriptors: (*Ground effect, Theory), (*Ground effect machines, Analysis), (*Armed forces research, Scientific research), Thrust, Annular nozzles, Jets, Jet mixing flow, Aerodynamic characteristics.

Presented is a review and analysis of research programs dealing with the ground effect phenomena. The work of each of the contractors is briefly discussed and observations and recommendations to the Ad Hoc Steering Group for the Review and Analysis of the Ground Effect Phenomenon are included. (Author)

AD-415 934 Div. 9
(TISTM/RG) OTS price $12.50

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
NONEQUILIBRIUM BLUNT BODY FLOW USING THE METHOD OF INTEGRAL RELATIONS,
by William C. L. Shih, Judson R. Baron, Roy S. Krupp and William J. Towle. May 63, 165p. Technical rept. no. 66; Rept. no. DSR9126
Contract NOw62 0765d
Unclassified report

Descriptors: (*Blunt bodies, Aerodynamic characteristics), Shock waves, Chemical equilibrium, Spheres, Temperature, Ionization, Dissociation, Recombination reactions, Nitrogen, Oxygen, Nitrogen compounds, Monoxides, Hypersonic flight.

Extension of the method of integral relations to the problem of chemical coupling in nonequilibrium flow past axisymmetric blunt body was made. The method is direct in contrast to the inverse technique in which a shock shape is prescribed and the body shape is implied. Choice of the integral method for nonequilibrium flows appears logical in view of its success for the perfect gas blunt body problem and the inherent advantages of a direct method. For the first approximation, no additional assumptions beyond those already made for the perfect gas problem prove to be required. In principle, only an additional statement as to the conservation of each reacting species is necessary for nonequilibrium. Solutions for flow past a sphere for the first approximation using a five component gas model composed of N2, O2, N, O and NO are presented to show the variation of flow properties along the axial streamline and body surface. The pressure is rather insensitive to finite rate processes while other flow properties such as the temperature, density, and species concentrations prove quite sensitive to nonequilibrium effects. In particular, the concentration of NO shows a maximum along the stagnation streamline in the nonequilibrium situation which is not apparent from identically equilibrium solutions. (Author)

AD-415 975 Div. 9
(TISTP/JP) OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
LAMINAR, TRANSITIONAL, AND TURBULENT HEAT TRANSFER AFTER A SHARP DISCONTINUITY,
by Victor Zakkay, Kaoru Toba and Ta Jin Kuo.
July 63, 48p. PIBAL rept. no. 771
Grant AF AFOSR1 63, Proj. 9781 01
Unclassified report

Descriptors: (*Heat transfer, Boundary layer), Boundary layer transition, Stagnation point, Laminar boundary layer, Turbulent boundary layer, Blunt bodies, Conical bodies, Supersonic flow, Cylindrical bodies, Shear stresses, Sheets, Thermal radiation.

The flow field in the neighborhood of the discontinuity or a sharp corner is divided into two regions: The flow upstream of the discontinuity which is obtained by standard techniques, and that of downstream which is obtained by standard techniques, and that of downstream which is obtained by expanding both the supersonic and subsonic flow fields upstream of the discontinuity inviscidly around the corner. Downstream of the discontinuity, the flow is represented by a viscous nonsimilar sublayer which starts at the discontinuity, and by a viscous shear layer which has the profiles immediately downstream of the discontinuity as initial conditions. Based upon this flow model, analysis has been developed using the inner and outer expansion techniques. The treatment of the laminar analysis is improved and the technique of application of this model is extended to include turbulent and transitional flow downstream of the corner. Finally, the results are compared with some of the experimental data available in the literature. It is indicated that good agreement was obtained. (Author)

AD-416 004 Div. 9
(TISTP/FEM) OTS price $5.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
PRESSURES IN THE STAGNATION REGIONS OF BLUNT BODIES IN THE VISCOUS-LAYER TO MERGED-LAYER REGIMES OF RAREFIED FLOW,
by J. Leith Potter and Allan B. Bailey. Sep 63, 46p.
Contract AF40 600 1000
AEDC TDR63 168 Unclassified report

Descriptors: (*Hypersonic flow, Pressure), (*Blunt bodies, Nose cones), Stagnation point, Reynolds number, Distribution, Gas flow, Diatomic molecules, Gases, Density, Curve fitting, Spheres, Experimental data, Axially symmetric flow, Wind tunnel models, Nozzles, Enthalpy.

Experimental data on pressures in the stagnation regions of hemispherical and flat noses on axisymmetric bodies in rarefied, hypersonic flow are presented. Diatomic and monatomic gases were used in the study, thereby illustrating the effect of molecular structure on the impact pressure. The experiments were conducted with the models in both cold-wall and insulated-wall conditions. It is concluded that impact pressures may be smaller than the corresponding inviscid values, although this reduction may amount to only a few percent. Small influences of wall heat transfer and molecular structure on impact pressure at a given Reynolds number are demonstrated. Pressure distribution on highly cooled, flat and hemispherical noses are predicted with generally acceptable accuracy by theories for inviscid flows. Flow conditions for these experiments were such that the Knudsen number of a full-scale nose having a radius of one foot and moving with hypersonic speed at altitudes of roughly 300,000 ft was duplicated. Thus, this report concerns the viscous-layer to merged-layer regimes of flow at altitudes above Earth where thermochemical reactions in the shock layers of blunt bodies are believed to be essentially frozen. (Author)

AD-416 031 Div. 9
(TISTP/FEM) OTS price $8.10

Polytechnic Inst. of Brooklyn, N. Y.
ON THE MIXING OF LAMINAR AND TURBULENT AXIALLY SYMMETRIC COMPRESSIBLE FLOWS,
by Gdalia Kleinstein. June 63, 75p.
Contract AF33 616 7661, Proj. 7064, Task 706401
ARL 63 108 Unclassified report

Report on Aerothermodynamic Investigations in High Speed Flow.

Descriptors: (*Compressible flow, Jet mixing flow), (*Axially symmetric flow, Turbulence), Analysis, Equations, Laminar flow, Boundary layer, Viscosity, Probability, Transformations (Mathematics), Integral equations, Incompressible flow, Momentum, Energy.

A unified analysis to solve mixing problems involving momentum, energy, and mass transfer in both laminar and turbulent axially symmetric compressible flow is presented. The method is based on the linearization of the conservation equations in the plane of the von Mises variables while retaining the essential nonlinear nature of the equations in the physical plane. The application of this method to a laminar flow problem is shown to be in good agreement with a numerical solution of the boundary layer equations obtained by Pai. The application of this method to turbulent flow requires an expression for the eddy viscosity. Prandtl's formulation has been applied successfully to problems involving incompressible flow. To allow for compressibility effects, a possible modification of Prandtl's formulation, suggested by Ferri, is investigated. When this expression for eddy viscosity is introduced, the application of the present method to compressible turbulent flow yields analytical results which are in good agreement with available experimental data. (Author)

AD-416 045 Div. 9, 25
(TISTM/TCG) OTS price $3.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
THE MERGING OF TWO SHEAR FLOWS WITH DIFFERENT FLUID PROPERTIES,
by A. S. Hersh. 26 Feb 63, 30p. Rept. no. SM42998
Unclassified report

Descriptors: (*Fluid flow, Shear stresses), (*Fluids, Fluid dynamic properties), Viscosity, Density, Velocity, Equations, Motion, Boundary layer, Pressure, Differential equations, Water, Air.

The similarity solution for the merging of two initially constant, infinite shear flows of Rott and Hakkinen has been extended to the merging of two different fluids. It was found that two parameters describe the physical properties of the two merging flow fields. The possibility of a vorticity-induced pressure gradient was considered; in that case, the dependence on the fluid parameters is much more complicated. An application of particular interest is the initial entrainment of stagnant air by water and of stagnant water by air. (Author)

AD-416 048 Div. 9, 1
(TISTA/VGW) OTS price $8.60

Walker, Norman K. Associates, Inc., Bethesda, Md.
AN ANALYSIS OF THE RESULTS OF WIND TUNNEL TESTS MADE AT THE UNIVERSITY OF WICHITA ON CIRCULAR ANNULAR JET GROUND EFFECT MACHINE MODELS,
by Norman K. Walker and Robert J. Neal. July 63, 87p. Rept. no. 5
Contract Nonr341200
Unclassified report

Descriptors: (*Ground effect machines, Annular nozzles), (*Annular nozzles, Ground effect machines), Wind tunnel models, Model tests, Experimental data, Lift, Fluid flow, Jets, Angle of attack, Aerodynamic characteristics, Pressure.

The tests conducted on circular GEM models at the University of Wichita in 1960 and 1961 for the Office of Naval Research are the most comprehensive source of wind tunnel data on ground effect machines now available. A wide range of jet thicknesses and jet angles were tested over a great altitude range. Jet pressures and wind tunnel speeds were varied and measurements were made of lift, drag, pitching moment and jet mass flow for a number of values of the angle of incidence between model and ground board. Pressure distributions were also measured in detail but this data has not, in general, been reduced. This report analyzes the zero incidence case in detail. It is shown that the results are very consistent and that the effect of forward speed and jet pressure ratio can be eliminated by the use of a forward speed parameter. (Author)

AD-416 140 Div. 9
(TISTM/EJH) OTS price $8.60

Bureau of Mines, Pittsburgh, Pa.
HIGH SPEED AERODYNAMICS AND JET PROPULSION. VOLUME I, SECTION F. PROPERTIES OF LIQUIDS AND LIQUID SOLUTIONS,
by John M. Richardson and Stuart R. Brinkley, Jr. 20 Mar 53, 1v.
Proj. PX3 108
BM P Rept. no. 1128 Unclassified report

Descriptors: (*Liquids, Theory), Thermodynamics, Hydrodynamics, Transport properties, Surface tension, Mathematical analysis, Integral equations, Jet propulsion.

Contents:
Statistical mechanical description of liquids
Cell theories of liquids
Theories of the radial distribution function
Transport processes
Surface tension of liquids

AD-416 163 Div. 9
(TISTE/CAM) OTS price $2.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
IMPROVED FIRST-ORDER SUPERCAVITATING THEORY,
by P. Ward Brown. Aug 63, 16p. Rept. no. 971
Contract Nonr263 20, Proj. NR062 212
Unclassified report

Descriptors: (*Hydrofoils, Cavitation), (*Wedges, Cavitation), Theory, Gas flow, Differential equations, Lift, Angle of attack, Pressure, Drag, Aerodynamic characteristics, Aerodynamic configurations.

Conventional first-order supercavitating hydrofoil theory is reviewed, and it is shown that, by avoiding the usual linearization of the physical plane, general expressions for improved force coefficients may be obtained in terms of the conventional first-order coefficients. Specific examples are given including supercavitating flow about a cambered hydrofoil, a symmetric wedge and a flat-plate hydrofoil with flap. Comparison with exact solutions shows that the improved first-order lift is generally within 5%, for angles up to 90. (Author)

AD-416 193 Div. 9
(TISTP/FEM) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
THE EFFECT OF FRICTION ON OPTIMUM TWO-DIMENSIONAL WINGS IN LINEARIZED SUPERSONIC FLOW,
by Angelo Miele and Robert E. Pritchard. Aug 63, 27p. FSLT Rept. no. 78; Document no. D1 82 0277
Unclassified report

Also available from the author.

Descriptors: (*Friction, Wing-body configurations), (*Supersonic flow, Wings), Thickness, Airfoils, Lift, Calculus of variations, Wedges, Pressure, Integral equations, Numerical analysis.

The problem of minimizing the zero-lift drag of two-dimensional wings in supersonic flow is considered including the effect of friction. It is assumed that the distribution of pressure coefficients is that which results from the linearized theory, that the friction coefficient is constant, that the chord of the airfoil is free, and that any number of conditions is imposed on the thickness, the enclosed area, the moment of inertia of the contour, and the moment of inertia of the enclosed area. By means of the indirect methods of the calculus of variations, a general solution is obtained. (Author)

AD-416 279 Div. 9
(TISTM/BRW) OTS price $2.60

Cornell U., Ithaca, N. Y.
THE HYDROMAGNETICS OF AN ELLIPSOID MOVING IN A CROSS-FIELD,
by G. S. S. Ludford and M. P. Singh. July 63, 21p.
Technical rept. no. 4
Contract Nonr40146 and Grant G19911
Unclassified report

Descriptors: (*Fluid flow, Magnetic fields), (*Ellipsoids, Fluid flow), Fluid mechanics, Fluids, Electrical conductance, Mathematical analysis.

AD-416 280 Div. 9, 25
(TISTM/ODN) OTS price $1.10

Cornell U., Ithaca, N. Y.
THE HYDROMAGNETICS OF A SPHERICAL CONDUCTOR,
by G. S. S. Ludford and M. P. Singh. July 63, 4p.
Technical rept. no. 5
Contract Nonr40146 and Grant G19911
Unclassified report

Descriptors: (*Liquids, Magnetic properties), (*Fluids, Magnetic properties), Magnetic fields, Theory, Electric fields, Electrical conductance, Equations, Spheres, Fluid flow.

AD-416 371 Div. 9
(TISTP/JP) OTS price $3.60

Hermann Foettinger Institut (Germany).
ON THE INSTABILITY AND NON-LINEAR DEVELOPMENT OF A DISTURBED SHEAR LAYER,
by A. Michalke. 31 May 63, 31p. Technical note no. 2
AF61 052 412
AFOSR Rept. no. 5170 Unclassified report

Descriptors: (*Laminar boundary layer, Shear stresses), Vortices, Fluid flow, Reynolds number, Stability, Nonlinear systems.

An attempt is made to calculate approximately the non-linear development of a distrubed shear layer. The disturbance of the shear layer was obtained by the methods of the inviscid linearized stability theory. By means of the eigenfunctions of the problem the streamlines of the distrubance motion were calculated. It was found that the disturbance of the shear layer is represented by two vortex sheets which will be superposed to the vorticity distribution of the undisturbed shear layer. According to Rosenhead's simplification the non-linear development was calculated by replacing the continuously distributed vorticity by a number of individual vortices and computating the motion of this vortices caused by the mutual induction. It was found that the distrubed shear layer rolls up and a concentration of vorticity results. (Author)

AD-416 375 Div. 9, 25
(TISTP/FEM) OTS price $2.60

Institute of Engineering Research U. of Calif., Berkeley.
CALCULATION OF AERODYNAMIC FORCES ON CYLINDRICAL SHELLS IN UNSTEADY SUPERSONIC FLOW,
by R. A. Brown and M. Holt. Apr 63, 1v. Rept. no. AS63 1
Grant AFOSR268 63
AFOSR 5158 Unclassified report

Descriptors: (*Cylindrical bodies, Aerodynamic characteristics), (*Supersonic flow, Frozen equilibrium flow), Vibration, Aerodynamic loading, Phase shifters, Flutter, Bessel functions, Integral transforms, Integral equations.

The aerodynamic forces resulting from the vibra-

tion of a cylindrical shell of finite length in a supersonic stream have previously been calculated using the static approximation. In this the flow field is determined as though it were steady in the state frozen at a given instant. In the present report the static approximation is improved and account is taken of first order effects in vibration frequency. This causes a phase shift between the shell displacement and the corresponding pressure or aerodynamic force coefficient. The phase shift varies with distance along the cylinder, the phase angle changing very rapidly in the neighborhood of zero of certain modified Bessel functions and remaining sensibly constant in between. (Author)

AD-416 495 Div. 9
(TISTP/WH) OTS price $6.60

Space Technology Labs., Inc., Redondo Beach, Calif.
TURBULENT DIFFUSION OF A REACTING GAS IN THE WAKE OF A SHARP-NOSED BODY AT HYPERSONIC SPEEDS,
by W. H. Webb and Leslie A. Hromas. 15 Apr 63, 57p. Rept. no. 6130 6362RU000
Contract AF04 694 1
BSD TDR63 138 Unclassified report

Descriptors: (*Aerodynamic configurations, Wake), (*Wake, Aerodynamic configurations), Hypersonic flow, Turbulent boundary layer, Dissociation, Recombination reactions, Reaction kinetics.

The non-equilibrium turbulent wake of a sharp nosed body is considered. Approximate integral solutions are given for the distribution of species and for the thermal properties of the wake. The method used essentially represents an extension to the case of a reacting wake of the method of Lees and Hromas which was originally developed for an equilibrium wake. In the chemical kinetic model studied, particular attention is paid to the processes of far downstream electron decay and the appropriate oxygen attachment reactions are investigated. Some simple explicit solutions for the species diffusion in the wake are considered and detailed numerical calculations are given for both a simple dissociating gas and for a full air chemistry calculation. Finally, the scaling laws exhibited by these calculations are discussed. (Author)

AD-416 496 Div. 9, 30
(TISTP/WH) OTS price $11.50

Southwest Research Inst., San Antonio, Texas.
AN EXPERIMENTAL DRAG FACILITY.
Final rept.,
by M. L. Whitfield, E. M. Briggs, R. K. Gregory, and R. C. DeHart. 15 Mar 63, 143p. Proj. 1029 3
Contract DA49 146xz062
DASA 1369 Unclassified report

Descriptors: (*Shock waves, Simulation), (*Shock tubes, Solid rocket propellants), Nuclear explosions, Feasibility studies.

Experiments have shown that solid propellants can substantially supplement and prolong the positive pressure pulse in a standard shock tube, provided that proper design and operational procedures are observed. The extra energy from the solid propellant allows for expedient simulation of nuclear blast wave conditions within the tube. Three types of solid propellant rocket motors from standard stock were utilized. Pressure, temperature, and velocity characteristics of gas flow generated by the motor and discharged through a nozzle into the tube were recorded as a function of time at several locations down the tube. In addition, a unique technique for generating a shock wave at a preselected time during the high velocity gas flow was developed. (Author)

10. FUELS AND COMBUSTION

AD-416 291 Div. 10, 27
(TISTM/REB) OTS price $2.60

Little, Arthur D., Inc., Cambridge, Mass.
ABSTRACTS OF PAPERS. 16TH AIR FORCE OFFICE OF SCIENTIFIC RESEARCH CONTRACTORS' MEETING ON LIQUID ROCKET COMBUSTION RESEARCH JUNE 25-28, 1963.
1963, 17p.
AFOSR 5203 Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Combustion) (*Abstracts, Rocket motors (Liquid propellant)) (*Combustion, Rocket motors (Liquid propellant)) Stability, Detonations, Measurement, Bipropellants, High frequency, Feasibility studies, Gaseous rocket propellants, Oxygen, Liquefied gases, Hydrogen, Reaction kinetics, Seals (Stoppers), Wave transmission, Propagation.

AD-416 332 Div. 10
(TISTM/TCG) OTS price $4.60

Princeton U., N. J.
A CRITICAL REVIEW OF RECENT RESEARCH ON THE MECHANISM OF IGNITION OF SOLID ROCKET PROPELLANTS,
by M. Summerfield, R. Shinnar, C. E. Hermance, and J. Wenograd. 26 Aug 63, 1v. AEL rept. no. 661
Grant AF AFOSR92 63
Unclassified report

Descriptors: (*Solid rocket propellants, Ignition), (*Combustion, Solid rocket propellants), (*Bibliographies, Solid rocket propellants), Theory, Burning rate, Exploding wires, Shock tubes, Chemical reactions, Oxidation, Gases, Furnaces, Solids, Phase studies, Flames, Flame propagation, Heat transfer, Gas flow, Convection, Composite materials, Propellants, Nitrates, Esters, Rocket motors (Solid propellants).

A number of experimental techniques varying in form and concept have been used to study the ignition of composite and nitrate ester propellants. Both slow and fast ignitions have been studied, and ignition delays have ranged from 20 sec down to less than a millisecond. In the experiments which have been conducted, the propellants have been heated by hot wires, test furnaces of various types, flowing gas streams at elevated temperatures, shock tubes and shock tunnnels, highly reactive oxidizing gases, arc-image furnaces, etc. This review will contain a description of the various theories which have been used to account for the phenomenon of propellant ignition, a discussion of the experimental methods which have been applied to this study, and an evaluation of the reported results. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-416 345 Div. 11
(TISTE/OHD) OTS price $16.00

Booz-Allen Applied Research, INC., Bethesda, Md.
OPERATIONAL ANALYSIS OF THE USE OF AIR CUSHION VEHICLES IN SUPPORT OF THE ARMY'S OFF-ROAD LOGISTIC MISSION.
Aug 63, 231p.
Contract DA44 177tc855, Task 1D021701A04807
TRECOM TR63 37 Unclassified report

Descriptors: (*Vehicles, Army research), (*Ground effect machines, Cargo vehicles), Feasibility studies, Mobile, Effectiveness, Costs, Helicopters, Operations research, Mathematical models, Trailers, Mathematical analysis, Logistics.

The feasibility, performance and cost/effectiveness of a family of air cushion vehicles (ACV) and air cushion trailers (ACT) are investigated. A standard off-road environment is developed and a typical Army off-road logistics mission defined. Through the use of a mathematical deterministic model, optimum vehicles with and without wheels are compared with conventional off-road vehicles in current use and those contemplated for the 1965-70 time frame. Analytical expressions are developed for wheel performance in a variety of terrains and the advantages of off-loading for optimum performance determined. A cost methodology is proposed and used for the purpose of comparing air cushion vehicles with other off-road vehicles and the Chinook helicopter. Results strongly indicate the necessity of fitting wheels of overland ACV's and the need for reciprocating rather than turbine engines for lift and locomotion if the maximum cost effectivity is to be achieved. (Author)

12. GUIDED MISSILES

AD-415 625 Div. 12, 26
(TISTW/RHR) OTS price $2.60

Aerojet-General Corp., Sacramento, Calif.
GENERAL TEST PLAN FOR QUALITY ASSURANCE MINUTEMAN SECOND-STAGE MOTORS,
by D. G. Wagner. 20 June 62, 18p. Rept. no. 0162 01MP6B
Contract AF04 647 691
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Second-stage motors), (*Second-stage motors, Quality control), Rocket motors, Specifications, Reliability, Instrumentation, Reports, Nozzles, Temperature control, Test facilities, Test equipment, Production, Photographic analysis.

This general test plan establishes the requirements and describes the procedures and actions necessary to accomplish the Quality Assurance Program for Wing I second-stage Minuteman operational motors. The test plan is based on the requirements stated in the operational-motor model specification (Model Specification S-133-1002, AGC-30115). All AFBSD-approved revisions to the requirements stated in the operational-motor model specification will supersede the requirements presented. The test requirements include those for test conditions, test procedures, instrumentation, and method of sampling for quality assurance motors. (Author)

AD-415 628 Div. 12
(TISTW/JEA) OTS price $11.50

Boeing Co., Seattle, Wash.
QUALIFICATION PROGRAM AND STATUS REPORT -- MINUTEMAN WEAPON SYSTEM,
by R. C. Hyslop. 13 Dec 62, 1v. D2 14875, Rev. G
Contract AF04 647 289
Unclassified report

Descriptors: (*Weapon systems, Guided missiles (Surface to surface)), (*Ground support equipment, Weapon systems), Specifications, Design, Transporter-erector, Electrical equipment, Control systems, Cable assemblies, Safety devices, Fire control systems.

AD-415 673 Div. 12, 2, 16
(TISTP/FEM) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ARTIFICIAL SATELLITES OF THE EARTH (SELECTED ARTICLES).
23 Apr 63, 45p.
FTD TT62 1585 Unclassified report

Trans. from Iskusstvennyye Sputniki Zemli, AN SSSR, No. 13, pp. 67-84, 123-133, 1962.

Descriptors: (*Satellites (Artificial), Scintillation counters), (*Space environmental conditions, Cosmic rays), Measurement, Radiometers, Radiation measurement, Intensity, Background, Flight paths, Bremsstrahlung, Photomultipliers, Tropical regions, Dosage, Absorption, Energy, Dosimeters, Radiation effects, Vibration, Acceleration, Weightlessness, Microorganisms, Blood circulation.

Contents: Radiation Belts Around the Earth at Altitudes of 180 to 250 Km; Soft Corpuscular Radiation at an Altitude of 320 km in The Equatorial Latitudes; Measurement of Absorbed Dosage on Third Satellite Space Vehicle; Effect of Factors Encountered in the Space Flight of the Satellite Vehicle Vostok-2 on Microorganisms (Investigation of Yeast Organisms of Various Ploidy); Results Obtained in the Investigation of Certain Indicators of Peripheral Blood Circulation in DogsDuring and After a Flight Into Outer Space. (Author)

AD-415 815 Div. 12
(TISTA/VGW) OTS price $2.60

Princeton U., N. J.
AN ACCURACY ANALYSIS FOR TWO DIMENSIONAL INTERCEPTIONS OF VEHICLES IN ORBITAL AND SUB-ORBITAL TRAJECTORIES,
by Francis J. Mason. May 63, 1v.
Unclassified report

Master's thesis.

Descriptors: (*Satellites (Artificial), Intercept trajectories), Celestial mechanics, Orbital trajectories, Suborbital trajectories, Interception, Errors.

Two dimensional single impulse interceptions of targets at low altitude in a single body gravitational field are analyzed. Simple approximate relations between in-plane RMS miss distance and burnout velocity errors are derived, and the effectiveness of guidance system improvements is discussed on the basis of these approximations. (Author)

AD-415 971 Div. 12
(TISTW/RHR) OTS price $1.10

Naval Ordnance Test Station, China Lake, Calif.
SIDEWINDER 1A MK 15 AND MK 17 ROCKET MOTORS - INSPECTION AND MAINTENANCE,
by C. Blenman, Jr. and William B. McLean.
30 Aug 63, 2p.
NOTS TP3170 Unclassified report

Descriptors: (*Guided missiles (Air to air), Maintenance), (*Rocket motors (Solid propellant), Fuze functioning elements), Corrosion, Malfunctions, Springs, Quality control, Corrosion inhibition, Oils, Air Force, Navy.

AD-415 972 Div. 12, 26, 30
(TISTW/RHR) OTS price $7.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT-FTM-435 MODEL SPECIFICATION S-133-1000-0-1,
by Robert J. Hemmestad. 20 Aug 63, 1v. Rept. no. D2 3929 435
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface, Acceptability), (*Guided missile components, Quality control), Research program administration, Guided missiles, Configuration, Specifications, Procurement, Visual inspection, Test equipment, Rocket motors.

The prupose of D2-3929 is to document an Acceptance Summary Report for Flight Test Missiles as required to support Final Acceptance activities at the Boeing Test Site. It provides evidence of Missile Configuration Identification and Certification. It defines deviations from compliance with the Airborne Vehicle Model Specification, S-133-1000-0-1. (Author)

Division 12 - GUIDED MISSILES

AD-415 973 Div. 12
(TISTP/HSS) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE - PHASE III.
Monthly progress rept. no. 19, 1-31 July 63,
by L. W. Ricketts. 7 Aug 63, 2p.
Contract DA11 0220RD4048
Unclassified report

Descriptors: (*Arming devices, Design), (*Safety devices, Guided missile warheads), Guided missile components, Switching circuits.

The purpose of this third phase four-month program is to design, develop and fabricate at least three miniature electronic Solid State Arm Safe Devices capable of functioning in various warheads for Army missiles under a wide range of environmental conditions. The first outputs must activate a squib at a preselected acceleration. The second output is to have a Solid State switching circuit which will provide an electrical change of state after the missile has traveled a preselected distance from the launch site. (Author)

AD-416 023 Div. 12, 22
(TISTP/RD) OTS price $7.60

Electronics Research Lab., Northeastern U., Boston, Mass.
DATA TRANSMISSION AND TRAJECTORY DETERMINING DEVICES FOR RESEARCH ROCKETS AND SATELLITES.
Final rept., vol. 1, 1 Apr 58-30 June 63,
by J. Spencer Rochefort, Lawrence J. O'Connor, Charles H. Price, Jr., and Raimundas Sukys.
30 June 63, 75p.
Contract AF19 604 3506, Proj. 7659, Task 765901
AFCRL 63 821, vol. 1 Unclassified report

Descriptors: (*Data transmission systems, Hypersonic test vehicles), Telemetering transmitters, Telemeter systems, Sounding rockets, Balloons, Satellites (Artificial), Plasma sheath, Reentry vehicles, Hypersonic test vehicles, Test vehicles, Launch vehicles (Aerospace), Instrumentation, Space probes, Atmosphere entry.

Research concerns evaluation of commercial components, system components and systems; field support for sounding rockets and balloons; and programs involving large probes and satellites. Some of the circuits developed are treated quite briefly since they are discussed in greater depth in publications or scientific reports which are generally available. The majority of the report deals with the unpublished work: a dual triggered parallel-read commutator for an aspect system; the development of a PAM/FM system; a re-entry physics program concerned with using Trailblazer vehicles to measure the effects the plasma sheath on communications; the instrumentation of the Research Satellite for Environmental Sciences; a tabulation of field assistance; and a discussion of a program for the evaluation of commercial airborne telemetry system equipments. In the latter case, the test procedures and equipment tested are given. (Author)

AD-416 051 Div. 12, 8, 7, 5
(TISTP/AW) OTS price $6.60

Boeing Co., Seattle, Wash.
ENGINEERING DEVELOPMENT LABORATORY (EDL) TEST REPORTS, LAUNCH AND COMMUNICATION CONTROL CONSOLE,
by D. Gladish. 5 Feb 63, 1v. Document no. T2 2564, Vol. 3 - Rev. A and B
Contract AF04 647 289
Unclassified report

Descriptors: (*Control panels, Launching), (*Launching, Control panels), Ground support equipment, Human engineering, Electrical equipment, Indicator lights, Control knobs, Guided missiles (Surface-to-surface), Communication equipment, Electronic equipment, Warning systems.

The Launch Control Console was inspected for physical appearances, conformance to engineering drawing and human engineering requirements. The components and subsystems of the console are pedestal structure assembly, top section assembly, LCC pedestal assembly, missile status launcher indicator, alarm and monitor panel, program control panel, launch control panel, D. C. power filter, alarm control, and audible alarm assembly. (Author)

AD-416 200 Div. 12
(TISTM/AMS) OTS price $2.60

Rocketdyne, Canoga Park, Calif.
INCREASED-CAPACITY LUBE TANK FOR THE ATLAS MA-5 SUSTAINER ENGINE.
Final rept.
6 Sep 63, 73p. R5309
Contract AF04 695 306
Unclassified report

Descriptors: (*Oil tanks, Guided missile components), (*Guided missile components, Oil tanks), Design, Models (Simulations), Lubrication, Tests, Pressure, Volume, Model tests, Test methods, Experimental data, Guided missiles (Surface-to-surface).

The MA-5 engine and laboratory test results for the increased-capacity sustainer lube oil tank are described. The tank capacity was increased by approximately 2 gallons to extend the duration from the present 300-second minimum to a 346-second minimum. The tests were conducted to verify hardware integrity and system compatibility. The additional evaluation items which were included in the engine test program are briefly described. (Author)

AD-416 219 Div. 12, 9, 30
(TISTA/VGW) OTS price $10.10

Southwest Research Inst., San Antonio, Tex.
SHOCK AND HYPERVELOCITY STUDIES IN A SOLID PROPELLANT DRIVEN TUNNEL.
Final rept.,
by M. L. Whitfield, E. M. Briggs, R. K. Gregory, B. W. Vanzant and R. C. DeHart. 16 Apr 63, 116p.
Contract DA49 146XZ062, Proj. 1029 3
DASA 1378 Unclassified report

Descriptors: (*Re-entry vehicles, Blast), (*Hypersonic wind tunnels, Shock waves), (*Atmospheric entry), Antimissile defense systems, Simulation, Solid rocket propellants, Hypersonic flow, Aerodynamic loading, Gust loads, Velocity, Temperature, Schlieren photography, Pressure, Wind tunnel models, Model tests.

Shock waves superposed on hypervelocity flow in a solid propellant driven tunnel were used to simulate the conditions experienced by a re-entry vehicle encountering a blast wave. The flow velocity and high stagnation temperatures produced were measured using currently available techniques. This research was conducted to develop a technique for determining the shock loading on re-entry vehicles. (Author)

AD-416 252 Div. 12
(TISTP/TLG) OTS price $4.60

RAND Corp., Santa Monica, Calif.
SATELLITE LIFETIMES IN NEARLY CIRCULAR ORIBTS FOR VARIOUS EARTH-ATMOSPHERE MODELS,
by L. N. Rowell. Aug 63, 31p. Memo. no. RM3700PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Orbital trajectories, Mathematical analysis), (*Satellites (Artificial), Life expectancy), Celestial mechanics, Gravity, Drag, Atmosphere models, Perturbation theory.

The effects on Earth-satellite lifetimes of altitude, orbit-plane inclination, and perturbation forces for close-in, nearly circular orbits were investigated. The lifetimes of two large, heavy satellites were studied. Studies of orbits with initial altitudes of from 75 to 150 n mi show that satellite lifetime increases significantly as the orbit-plane inclination increases toward 90 deg, and that the ratio of change in lifetime to change in orbit-plane inclination increases as the orbital altitude increases. Satellite lifetimes based on an oblate atmosphere model are significantly greater than those based on a spherical atmosphere model for nonequatorial satellites. The combined gravitational attractions of the Moon and Sun cause only negligible variations in the lifetimes of the satellites studied. The Earth's gravitational field does not directly affect lifetimes but produces orbital motions which, when combined with the atmospheric drag forces, can produce considerable changes in satellite lifetimes. (Author)

AD-416 294 Div. 12, 14, 26
(TISTM/TCG) OTS price $17.00

Aerojet-General Corp., Azusa, Calif.
ROCKETS IN SPACE ENVIRONMENT. VOLUME I - THE EXPERIMENTAL PROGRAM.
Final rept.,
by P. D. Gray, G. K. Cornelius, J. D. O'Donnell, and W. W. Howard. Feb 63, 1v. Rept. no. 2484, V1
Contract AF04 611 7441, Proj. nos. 3058 03 and 6753 01
RTD TDR63 1050, V1 Unclassified report

Descriptors: (*Materials, Space environmental conditions), (*Space environmental conditions, Materials), (*Spacecraft, Design), Elastomers, Plastics, Lubricants, Propellants, Ablation, Valves, Actuators, Bearings, Meteors, Simulation, Impact shock, Storage, Stability, Cryogenics, Thermal insulation, Coatings, Pyrolysis, Compatibility, Mechanical properties, Tests, Test equipment, Infrared radiation, Ultraviolet radiation, Alloys, Handbooks.

Environmental factors constituting the space environment between 300 and 22,000 n.mi. altitude were defined. These factors included radiation (ultraviolet, infrared, and penetrating), micrometeoroids, vacuum, and zero gravity. The effects of simulated space-environmental exposure were evaluated on elastomers, structural plastics, lubricants, propellants, ablative materials, valves, regulators, actuators, bearings, and other items. It was found that large radiation doses 10 to the -9th power erg/g (C) were found to cause a minute quantity of the storable propellants tested to decompose into insoluble gases. The effects of simulated micrometeoroid impact on structural materials and propellant tank insulations were evaluated. It was found that standoff barriers and insulating materials can offer substantial protection from micrometeoroid impact. An analytical technique was developed to permit accurate evaluation of the space storability of a wide variety of propellant combinations in different vehicle configurations. (Author)

AD-416 455 Div. 12
(TISTM/ODN) OTS price $7.60

Boeing Co., Seattle, Wash.
QUALIFICATION PROGRAM AND STATUS REPORT. MINUTEMAN WEAPON SYSTEM,
by R. C. Hyslop and K. R. Seal. Dec 62, 1v. Rept. no. D2 14875
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Tests), Guided missiles (Surface to surface), Air force, Weapon systems, Military requirements.

AD-416 484 Div. 12, 26
(TISTA/VGW) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
RELIABILITY PLAN FOR THE AGENA SYSTEM/GEMINI PROGRAM.
4 Sep 63, 1v. Rept. no. LMSC A057701
Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Reliability), Manned spacecraft, Lunar satellites, Research program administration, Military requirements, Specifications.

This document dientifies the reliability program requirements for Aerospace Systems, Subsystems and Equipment for the Phase II Target Vehicle System Gemini Program. The reliability program, including procedures, is subject to surveillance by AFSSD/AFPRO/MSC. The contractor's procedures used to implement the requirements of this plan shall be subject to the disapproval of the Air Force Plant Representative. The reliability effort for the Basic Agena D Vehicle, and optional equipment, is outside the scope of this document. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-415 966 Div. 13, 6
(TISTE/JWS) OTS price $9.60

AiResearch Mfg. Co., Los Angeles, Calif.
DESIGN AND DEVELOPMENT OF A MINIATURE NON-RECIPROCATING CLOSED-CYCLE CRYOGENIC COOLER. PHASE I.
Final rept.,
by Frank E. Maddocks, R. S. Jackson, N. Van Le, R. V. Hoffman and ed. by G. A. Burgess. July 63, 101p. SS960
Contract AF04 695 146, Proj. 5043, Task 504323B
SSD TDR63 240 Unclassified report

Descriptors: (*Centrifugal compressors, Refrigeration systems), (*Refrigeration systems, Cryogenics), (*Infrared detectors, Refrigeration systems), Nitrogen, Electric motors, Compressor rotars, Compressor stators, Gas bearings, Impellers, Bearings, Turbines, Generators, Alternating current, Heat exchangers, Miniature electrical equipment.

An analytical and development program for devel-

opment of a miniature nonreciprocating refrigerator is described. The objective of the present development is two watts of refrigeration for an IR detector at 77 ±7 K with a life expectancy compatible with operation in space. The results of preliminary testing and analysis are extremely encouraging. A suitable gas bearing design appears to have been found. Feasible compact heat exchanger configurations have been developed. A miniaturized first-stage compressor impeller and a complete experimental turboalternator were fabricated and tested with a reasonable degree of success. (Author)

AD-416 490 Div. 13, 29
(TISTM/ODN) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
ANALYSES OF HEAT DISSIPATION TECHNIQUES FOR PROTECTIVE SHELTERS,
by J. M. Stephenson and C. L. Herndon. 15 July 63, 12p.
Proj. Y F011 05 341
NCEL Technical note N523 Unclassified report

Descriptors: (*Shelters, Cooling and ventilating equipment), Heat transfer, Cooling, Pipes, Water, Ice, Compressed air, Oxygen, Liquified gases, Power supplies, Materials.

Seven cooling techniques were investigated and analyses were made to determine how practical each technique would be if incorporated into a 100-man shelter. The techniques were as follows: buried pipe grids using water as the heat transfer medium, a crushed rock heat sink using air as the heat transfer medium, vapor compression and absorption systems, well-water, ice storage utilizing mechanical refrigeration, compressed air, and liquid oxygen. Each system was examined with respect to the length of time it could be effectively operated, and its auxiliary requirements. None of the techniques appear to be satisfactory in all respects; however, the use of well-water is very attractive providing it is readily available at a cool enough temperature. Since power requirements are closely allied with cooling systems the problems associated with power supplies are discussed. The last section of the report is devoted to the total energy concept utilizing gas turbine package systems. (Author)

14. MATERIALS (NON-METALLIC)

AD-415 667 Div. 14
(TISTM/ODN) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE CHANGE IN THE PHYSICO-MECHANICAL AND ELECTRO-INSULATIONAL PROPERTIES OF SOME COMPRESSED MATERIALS UNDER THE INFLUENCE OF TEMPERATURE AND OTHER FACTORS (MOISTURE, FUELS AND OILS),
by V. A. Zakharov, G. N. Nadezhina and V. I. Sakharova. 15 Apr 63, 37p.
FTD TT62 1857 Unclassified report

Trans. from Steklotekstolity I Drugiye Konstruktsionnye Plastiki, pp. 130-168, 1960.

Descriptors: (*Glass textiles, Mechanical properties), (*Electric insulation, Materials), Electrical properties, Powders, Dielectric properties, Stability, Thermal stresses, Fuel oil, Temperature, Plastics, Asbestos, Fibers, Fuels, Moisture, Tests.

AD-415 674 Div. 14, 17, 26
(TISTM/BRW) OTS price $8.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TECHNOLOGY OF CERAMICS AND REFRACTORIES (SELECTED PARTS),
by P. P. Budnikov and A. S. Berezhnoy. 18 Apr 63, 79p.
FTD TT63 104 Unclassified report

Trans. from Tekhnologiya Keramiki I Ogneuporov, Gosudarstvennoye Izdatel'stvo Literatury Po Stroitel'stv, Arkhitekture I Stroitel'nym Materialam, Moskva, pp. 374-396, 400-409, 421-429, 1962.

Descriptors: (*Refractory materials, Oxides), (*Ceramic materials, Processing), Cements, Cermets, Crucibles, Aluminum compounds, Beryllium compounds, Magnesium compounds, Calcium compounds, Zirconium compounds, Thorium compounds, Uranium compounds, Material forming, Heat treatment, Sintering, Extrusion, Manufacturing methods, Coatings, Casting, Ball mills, Furnaces, Nuclear properties, Cutting tools, Dies, Bearings, Thermal conductivity, Thermal expansion, Mechanical properties, Crystal structure, Metals.

AD-415 733 Div. 14, 4
(TISTM/TCG) OTS price $1.60

Pennsalt Chemicals Corp., Philadelphia, Pa.
AN ATTEMPT TO SYNTHESIZE A COORDINATION POLYMER OF THE TYPE (-M(AA)Y-)X,
by B. P. Block and Joseph Simkin. Apr 63, 10p.
Technical rept. no. 36
Contract Nonr268700, Task 356 408
Unclassified report

Descriptors: (*Inorganic polymers, Complex compounds), (*Complex compounds, Inorganic polymers), (*Organic compounds, Metalorganic compounds), Organic phosphor compounds, N-Heteocyclic compounds, Phosphine oxides, Benzene, Zinc compounds, Synthesis (Chemistry), Stability, Decomposition, Temperature, Spectra (Infrared), Aromatic compounds, Organic nitrogen compounds.

The attempt to make Zn(IDP)PhPO3 led, instead, to Zn2(IDEP)(PhPO3)2 where IDP represents 2,2-iminodipyridine. The presumably analogous Zn(py)PhPO3 was also prepared. It is suggested that these substances are polymers. Their thermal stabilities, however, are not high. This is related to the presence of neutral ligands and a strong bridging group. Reasons for the formation of the product observed are discussed. (Author)

AD-415 734 Div. 14, 4
(TISTM/TCG) OTS price $1.10

Pennsalt Chemicals Corp., Philadelphia, Pa.
INORGANIC COORDINATION POLYMERS. IV. THE ATTEMPTED REPLACEMENT OF ACETYLACETONATE LIGANDS WITH PICOLINATE LIGANDS,
by A. J. Saraceno and B. P. Block. Mar 63, 8p.
Technical rept. no. 35
Contract Nonr268700, Task NR356 408
Unclassified report

Descriptors: (*Inorganic polymers, Complex compounds), (*Complex compounds, Inorganic polymers), (*Organic compounds, Metalorganic compounds), Organic phosphoric compounds, N-heterocyclic compounds, Phosphene oxides,

Benzene, Chromium compounds, Chemical reactions, Synthesis (Chemistry), Chemical analysis, Spectra (Infrared), Absorption, Displacement reaction, Polymerization, Organic nitrogen compounds, Aromatic compounds.

A study of the reaction between tris(picolinato) chromium(III) and diphenylphosphinic acid in stoichiometry expected to yield Cr(C5H4nCOO)(OP(C6H5)2O)2. (Author)

AD-415 923 Div. 14, 25
(TISTM/BRW) OTS price $3.60

Tyco Inc., Wlatham, Mass.
THE TRAVELLING SOLVENT METHOD OF CRYSTAL GROWTH.
Final summary rept.,
by M. Weinstein, M. A. Wright, L. B. Griffiths and A. I. Mlavsky. July 63, 30p.
Contract AF19 604 8803, Proj. 4608, Task 460804
AFCRL 63 314 Unclassified report

Descriptors: (*Single crystals, Crystal growth), (*Semiconductors, Single crystals), (*Silicon alloys, Carbon alloys), (*Gallium alloys, Arsenic alloys), Intermetallic compounds, Purification, Zone melting, Electrical properties, Diodes (Semiconductors), Silicon compounds, Gallium compounds, Carbides, Arsenides.

The growth of single crystals of GaAs and SiC by a Travelling Solvent Method is discussed. The effect of temperature, temperature gradient, zone thickness, and crystal face relationship on crystal growth by TSM was investigated. Purification of the GaAs crystals and a decrease in dislocation density occurred during crystal growth by TSM. For GaAs crystal growth from Ga, the process was found to be diffusion controlled. P-N junctions were grown in GaAs by TSM. These junctions all showed the square law behavior characteristic of an extremely abrupt junction. (Author)

AD-416 011 Div. 14
(TISTM/BRW) OTS price $1.60

Plastics Lab., Princeton U., N. J.
PLASTICS LABORATORY REPORT.
Final rept.,
by L. F. Rahm. 1 Aug 63, 11p. Rept. no. 67.
Contract DA31 124ARO D21, Proj. 356 375
AROD 3654:6 Unclassified report

Descriptors: (*Polymers, Synthesis (Chemistry)), (*Dielectrics, Plastics), (*Plastics, Mechanical properties), Molecular structure, Chemical bonds, Polymerization, Catalysts, Electromagnetic properties, Semiconductors, Impurities, Hall effect, Crazing, Crystallization.

Contents: (1) Chemistry Section: Polymerization of nonconjugated double bond systems, Synthesis of Multiple-stranded Polymers; (2) Dielectrics section: Studies in semi-conducting high polymers; and (3) Mechanical Section: Failure mechanism in glassy state polymers, Crystallization mechanisms in isotactic polymers.

AD-416 036 Div. 14
(TISTM/AM) OTS price $3.60

Midwest Research Inst., Kansas City, Mo.
A STUDY OF THE PHYSICAL BASIS OF THE MECHANICAL PROPERTIES OF CERAMICS.
Final rept., 18 Apr 62-17 Apr 63,
by Gordon E. Gross. Aug 63, 30p.
Contract AF33 657 8572, Proj. 7350, Task 735003
ASD TDR63 605, pt. 1 Unclassified report

Descriptors: (*Ceramic materials, Mechanical properties), (*Reviews, Ceramic materials), Fracture (Mechanics), Beryllium, Ductility, Stresses, Crystal lattices, Brillouin zones, Brittleness, Hydrostatic pressure, Vacuum, Test equipment, Surfaces, Energy, Single crystals, Data, Magnesium compounds, Oxides, Test methods, Germanium, Hall effect, Resistance (Electrical), Theory, Bibliographies.

A literature survey of the properties of ceramics, both classical and more recent solid state theory, is presented. A better understanding of the ceramic properties as related to their electron-lattice structure was gained by correlating the mechanical properties of brittleness and ductility with the electronic and crystalline (lattice) properties of materials. To achieve the above, three goals were set: (1) to establish a physical basis for the brittleness and ductility of insulators (e.g., ceramics) and semi-metallic materials; (2) to develop an understanding of the role of surface energy in fracture of ceramics and other nonmetals; and (3) to reach some practical conclusions regarding the scatter in test values for strength of ceramic specimens. Experimental methods and results are given for surface energy and Hall coefficient measurements. (Author)

AD-416 047 Div. 14, 8
(TISTM/AW) OTS price $8.10

Radio Corp. of America, Somerville, N. J.
GALLIUM ARSENIDE VARACTOR DIODES.
Final development rept., 27 June 62-27 June 63,
by H. Kressel, A. Solomon, G. Kupsky and H. Lee.
26 Aug 63, 79p.
Contract NObsr87405, Proj. SR008031, Task 9349
Unclassified report

Descriptors: (*Gallium alloys, Arsenic alloys), (*Varactor diodes, Gallium compounds), Semiconductor devices, Frequency multipliers, Epitaxial growth, Diffusion, Standing wave ratios, Heat treatment, Measurements, Data, Tables, Equations, Design, Resistance (Electrical), Zinc, Impurities, Tin, Silicon, Impregnation, Production, Crystals, Electric currents.

Three types of devices for high efficiency power conversion between 12Gc and 24Gc were designed. The first type, Device A, was designed to yield 40% conversion efficiency, with a minimum of 25mw power input. Device B and C were designed to handle a minimum 100mw and 250mw input power, respectively. High cutoff diodes require an optimum combination of breakdown, series resistance, and junction capacitance. The use of p+nn+ epitaxial structures, with closely controlled n-region properties, offer the best means of achieving this goal. A number of excellent devices were fabricated with such material. Since, however, the technology of gallium arsenide epitaxial material preparations is still at an early stage, mechanical means of controlling the diode base thickness were also investigated. A ''well'' technique in which the base region directly under the junction is minimized has proved to be a practical means of fabricating high quality diodes. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-416 120 Div. 14
(TISTM/ODN) OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
EFFECT OF ANNEALING OF POLYMER GLASSES ON THE TEMPERATURE DEPENDENCE OF THE HEAT CAPACITY IN THE SOFTENING RANGE,
by M. V. Volkenshtein and Yu. A. Sharonov, tr. by Ingeborg V. Baker. 21 Aug 63, 14p.
RSIC Trans. no. 47 Unclassified report

Trans. from Vysokomolekulyarnye Soedineniya 3:11, pp. 1739-1745, 1961.

Descriptors: (*Polymers, Heat treatment), (*Glass, Heat treatment), Specific heat, Vinyl plastics, Styrene plastics, Enthalpy, Thermodynamics, Cooling.

By the method of dynamic heat capacity the softening of non-crystallizing vitreous polymers, such as polyvinylacetate and polystyrene, was investigated. It was established that the progress of heat capacity temperature substantially depended upon (1) heating rate, (2) annealment at temperatures lower than the vitrification temperature, and (3) the rate of the preliminary cooling. (Author)

AD-416 134 Div. 14, 26
(TISTM/ODN) OTS price $2.60

IIT Research Inst., Chicago, Ill.
GLASS FIBER STRENGTH ENHANCEMENT THROUGH BUNDLE DRAWING OPERATIONS.
Quarterly progress rept. no. 4, 7 Mar 63-7 June 63,
by H. H. Cornish and R. M. Chaney. June 63, 22p.
Contract N600 19 58450
Unclassified report

Descriptors: (*Glass textiles, Production), (*Ceramic fibers, Productions), Drawing (Machine processing), Mechanical properties, Tensile properties, Manufacturing methods, Photomicrography, Surface-active substances.

Work toward the development of a production technique for bundle drawing fibers with greatly enhanced tensile strength is described. This work includes studies on size, dependence of strength, wetting-dewetting of glass fibers by metals, metallizing techniques, bundle drawing studies, bundle separation studies, and specimen fabrication. Fibers in the size range from 1 to 3 microns were drawn in bundles, separated from the bundles, and shown to exhibit tensile strength well in excess of 1,000,000 psi. Superstrength fibers produced by this method can be made in continuous lengths as opposed to 'whiskers' which are limited to discrete lengths. (Author)

AD-416 271 Div. 14, 25
(TISTM/BRW) OTS price $1.10

Carborundum Co., Niagara Falls, N. Y.
A STUDY OF FUNDAMENTAL MECHANICAL PROPERTIES OF CERAMIC SINGLE CRYSTALS.
Bi-monthly progress rept. no. 2, 15 Mar-14 May 63,
by P. T. B. Shaffer and H. D. Batha. 22 May 63, 4p.
Contract N600 19 59749
AEC Rept. no. NP12874 Unclassified report

Descriptors: (*Silicon compounds, Carbides), (*Crystals, Mechanical properties), Elasticity, Loading (Mechanics), Deflection, Measurement, Impurities, Boron, Test equipment, Thickness, Ceramic materials, Single crystals.

Additional data on strength and elastic properties of boron-doped silicon carbide crystals have been obtained on thin (10-70mu) crystals. Analyses are being made to determine the specific effect of impurities on strength. (Author)

AD-416 276 Div. 14
(TISTM/BRW) OTS price $1.60

Buffalo U., N. Y.
(No title).
Progress rept. no. 17, 1 Nov 62-1 May 63,
by N. Juul, S. Sato and H. E. Strauss. 1 May 63, 14p.
Contract AF33 616 7791
AEC Rept. no. NP12878 Unclassified report

Descriptors: (*Carbon, Elasticity), (*High temperature research, Carbon), Creep, Graphite, Thermal conductivity, Thermal diffusion, Measurement, Heat treatment, Density, Resistance (Electrical), Temperature, Test equipment.

The results of measurements, as obtained with the new improved apparatus, of the Young's modulus in dependence on temperature from baked to graphitized state for a hard filler-hard binder (HF-HB) carbon are reported. In addition, two special types of carbon were investigated: the ''glassy carbon'' (Tokai Electrode Mfg. Co.) and a low density carbon (Great Lakes Carbon Corp.). The study of the temperature dependence of the Young's modulus for these carbons gives some indications as to the nature of starting materials. In continuation of the repeat measurements of the thermal conductivity and electrical resistivity on a soft filler-hard binder carbon, curves for 2100 and 2400 C heat treatment were obtained. Finally, an improved furnace for the ''steady'' sinusoidal heat flow method of measuring the diffusivity was built and tested in operation. (Author)

AD-416 304 Div. 14
(TISTM/BRW) OTS price $1.10

Naval Applied Science Lab., Brooklyn, N. Y.
STANDARDIZATION PROGRAM ON SHELF AGING OF SYNTHETIC AND NATURAL RUBBER MATERIALS.
Final rept.
11 Sep 63, 10p.
NASL 5974 Unclassified report

Descriptors: (*Rubber, Aging (Materials)), (*Synthetic rubber, Aging (Materials)), Storage, Low temperature research, Data, Tables, Elastomers, Gaskets, Vibration isolators, Temperature, Time, Heat, Humidity, Air, Carbon dioxide, Tensile properties, Compressive properties, Tests, Standardization, Rubber gaskets, Rubber seals.

The U.S. Naval Applied Science Laboratory was authorized to continue the 7-yr shelf aging program to determine whether the shelf life of elastomeric end-items can be extended beyond 3 years and to determine the correlation between shelf aging and accelerated heat aging. The test program was modified to determine at 12-month instead of 6-month intervals the tensile strength, elongation, tensile product, modulus at 300%

elongation and swelling ratio of the packaged and unpackaged specimens currently being subjected to shelf aging and low temperature conditioning. The samples consisted of a butadiene-styrene low temperature gasket material, a Buna N O-ring material, a natural rubber door hatch gasket material and a neoprene GR-T shock mount material. (Author)

AD-416 330 Div. 14, 30
(TISTM/TCG) OTS price $2.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
PREPARATION AND DIELECTRIC PROPERTIES OF A MULTICOMPONENT METALLIC OXIDE FILM,
by Janina J. Mitchell, Mar 63, 18p.
DA Task 3A99 15 006 03
AELRDL TR2340 Unclassified report

Descriptors: (*Metal films, Oxides), (*Oxides, Metal films), (*FILMS, Dielectric), Preparation, Thickness, Capacitance, Electrical properties, Measurement, Temperature, X-rays, Deformation, Fluorescence, Electron microscopy, Barium compounds, Titanium compounds, Strontium compounds, Alcohols, Salts, Photographic plates.

A new method for the deposition of amorphous and coherent films of Ba, Ti and Sr oxide is discussed. Details of preparation, deposition, and methods of electrical and structural analysis are given. The data indicate that the films are suitable for electronic application; it is suggested how the films may be further improved. (Author)

AD-416 435 Div. 14
(TISTB/AAR) OTS price $1.60

Forest Products Lab., Madison, Wis.
STRENGTH AND RELATED PROPERTIES OF MOUNTAIN HEMLOCK,
by Robert L. Youngs. July 63, 12p. Research paper FPL 3
Unclassified report

Descriptors: (*Wood, Physical properties), Materials, Moisture, Forestry, Trees.

Most strength and related properties of small clear specimens of mountain hemlock (Tsuga mertensiana) from two locations in Oregon were determined to be slightly lower than the species averages based on previous comparable evaluations of material from Montana and Alaska. This is more noticeable for green wood than for wood at 12 percent moisture content. Consideration of all available data indicates that standard strength properties of mountain hemlock are generally comparable to those of western hemlock (T. heterophylla), with the possible exception of the lower average modulus of elasticity for mountain hemlock. (Author)

AD-416 474 Div. 14, 17
(TISTM/AMS) OTS price $26.00

Army Research Office, Durham, N. C.
PROCEEDINGS. ARMY CONFERENCE ON DYNAMIC BEHAVIOR OF MATERIALS AND STRUCTURES, SPRINGFIELD ARMORY, SPRINGFIELD, MASSACHUSETTS, 26-28 SEPTEMBER 1962, WITH ABSTRACT SUPPLEMENTS OF SYMPOSIUM ON STRUCTURAL DYNAMICS UNDER HIGH IMPULSE LOADING, 17-18 SEPTEMBER 1962, DAYTON, OHIO, CO-SPONSORED BY THE AERONAUTICAL SYSTEMS DIVISION AND OFFICE OF AEROSPACE RESEARCH. SYMPOSIUM ON DYNAMIC BEHAVIOR OF MATERIALS, 27-28 SEPTEMBER 1962, ALBURQUERQUE, NEW MEXICO, CO-SPONSORED BY THE UNIVERSITY OF NEW MEXICO AND ROCKY MOUNTAIN DISTRICT, A. S. T. M.
1962, 553p.
Unclassified report

Descriptors: (*Materials, Symposia), (*Symposia, Materials), (*Mechanics, Symposia), Test methods, Tests, Stresses, Statics, Dynamics, Loading (Mechanics), Mechanical properties, Iron, Steel, Test equipment, Underground explosions, Shock waves, Fracture (Mechanics), Mechanics, Armor plate, Explosions, Deformation, Rubber, Nylon, Photoelasticity, Solids, Impact shock, Viscoelasticity, Crystal lattice defects, Polymers, Plastics, Abstracts, Single crystals.

15. MATHEMATICS

AD-415 690 Div. 15
(TISTP/HG) OTS price $9.60

Space Technology Labs., Inc., Redondo Beach, Calif.
NUMERICAL ANALYSIS OF SYSTEM AVAILABILITY AND OF PARAMETER ESTIMATION METHODS,
by W. J. Howard and N. Kaufman. Aug 63, 105p.
Contract AF04 694 3
Unclassified report

Descriptors: (*Numerical analysis, Data), (*Computers, Theory), (*Mathematical models, Simulation), Programming (Computers), Equations, Tables, Analysis, Weapon systems, Monte Carlo methods, Failure (Mechanics), Checkout equipment, Probability, Operations research.

Two problem areas concerning systems subject to periodic checkout, which were investigated with the aid of a computer are described. The first part (Parameter Estimation) summarizes the results of a Monte Carlo analysis to determine the feasibility and accuracy of measuring system failure rates, checkout error probabilities, and repair effectiveness from the numbers of systems passing and failing in three consecutive checkouts. The second part (Availability Analysis) describes, mainly through a series of graphs, the quantitative variation of system availability with a number of operational and maintenance parameters representing time durations of standby, checkout, and repair, failure rates during standby and checkout, repair effectiveness, decision errors during checkout, and test coverage. (Author)

AD-415 698 Div. 15
(TISTP/JP) OTS price $2.60

Operations Research Center, U. of Calif., Berkeley.
NOTES ON OPERATIONS RESEARCH -- 1,
by Richard W. Cottle. July 63, 30p. ORC63 19 RN1 RN3
Contract Nonr22283
Unclassified report

Descriptors: (*Operations research, Mathematical analysis), Matrix algebra, Games theory, Linear programming, Combinatorial analysis, Probability, Nonlinear systems, Inequalities, Scheduling.

Contents: Formal Self-Duality in Nonlinear Programming, An Infinite Game With a Convex-Concave Payoff Kernel, Leontief Matrices With Substitution, Some Quantitative Combinatorial Search Problems, Methods of Solutions of Linear Programming Under Uncertainty, Multiplex Method.

AD-415 759 Div. 15
(TISTP/HG) OTS price $2.30

Operations Research Center, U. of Calif., Berkeley.
POSITIVE (SEMI-) DEFINITE MATRICES AND MATHEMATICAL PROGRAMMING,
by George B. Dantzig and Richard W. Cottle.
15 May 63, 20p. ORC63 18RR
Contract Nonr22283
Unclassified report

Descriptors: (*Matrix algebra, Theory), (*Programming languages, Linear programming), Transformations (Functions), Partial differential equations, Functions.

A general mapping w of points z in RN into points w(z) in the same space is considered. It is shown that classical mathematical programming problems can all be restated as finding among those vectors z greater than or equal to 0 which map into w greater than or equal to 0, one which minimizes zTw. For a differentiable mapping w with a positive semi-definite Jacobian matrix the obviously sufficient (''complementary slackness'') condition zTw = 0 for a minimum is shown to be necessary. Next considered is the case which includes quadratic and linear programming: w = Mz + q where q is a fixed vector and M is positive (semi-) definite with constant coefficients. It is noted that the definiteness property is preserved for any equivalent system generated by an interchange of a subset of corresponding complements of z and w or what is the same thing by a ''block'' pivot on a principal minor of M. Since this result is related to recent ones obtained by A. Tucker and P. Wolfe, it is planned to incorporate its proof in a separate joint paper. Finally, a simple constructive solution of quadratic and linear programs is presented. In a sense the simplex method for linear programs and the results of Barankin, Dorfman, Wolfe, Beale, and Markowitz on quadratic programs reappear here but are curiously free of primal-dual structure. Complementary pairs of variables play a key role. (Author)

AD-415 764 Div. 15
(TISTP/HG) OTS price $8.60

Research Triangle Inst., Durham, N. C.
ON THE NON-PARAMETRIC ESTIMATION OF THE PROBABILITY DENSITY,
by M. R. Leadbetter. 24 May 63, 96p. Technical rept. no. 11; SU37
Contract Nonr342300
Unclassified report

Descriptors: (*Measure theory, Probability), (*Statistical analysis, Numerical analysis), Statistical functions, Sequences, Special functions, Functions, Integral transforms, Integrals, Integration, Inequalities.

AD-415 800 Div. 15
(TISTP/TL) OTS price $1.60

Purdue U., Lafayette, Ind.
A CHARACTERIZATION OF MULTICOHERENT PEANO SPACES,
by A. Lauria and C. J. Neugebauer. Nov 59, 14p.
Contract AF18 600 1484, Proj. 17501
Unclassified report

Descriptors: (*Topology, Measure theory), Transformations (Mathematics), Algebra, Algebraic topology.

AD-415 831 Div. 15
(TISTP/HG) OTS price $2.50

C-E-I-R, Inc., Beverly Hills, Calif.
TEST CRITERIA FOR PEARSON TYPE III DISTRIBUTIONS.
Final rept., Feb 62-Jan 63,
by M. R. Mickey, P. B. Mundle, D. N. Walker and A. M. Glinski. June 63, 108p.
Contract AF33 657 7900, Proj. 7071, Task 7071 01
ARL 63 100 Unclassified report

Report on Mathematical Techniques of Aeromechanics.

Descriptors: (*Statistical distributions, Statistical tests), (*Sampling, Statistical data), Statistical functions, Statistical anal-

ysis, Probability, Integral equations, Differential equations, Sequences, Inequalities, Integral transforms, Fourier analysis, Series, Tables, Programming (Computers).

Goodness-of-fit tests for the family of Pearson Type III distributions, and certain subfamilies, are investigated. A generally applicable computer program to calculate the large-sample distribution of the parametric Cramer-von Mises statistic, W sub n squared of theta equals M times the integral: (the square of the difference of F sub n of X and F of X; theta) d F (X; theta), for an efficient estimator is developed and applied to the Pearson Type III distribution, the gamma distribution, and the exponential distribution. The large-sample distribution theory of W sub n squared of theta is extended, and theoretical results on additional goodness-of-fit tests are derived. Results of sampling experiments are presented to indicate the appropriateness of the tabulated large-sample results to samples of moderate size, and sensitivity to the particular form of the estimators used. Results of sampling experiments are presented to indicate the low efficiency of the Pearson criterion K for testing whether a sample has been drawn from a Pearson Type III distribution. (Author)

AD-415 845 Div. 15
(TISTP/HG) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
ON THE REALIZATION OF LINEAR MULTIVARIABLE CONTROL SYSTEMS,
by George J. Thaler and Bui Tien Rung. Aug 63, 39p. Research paper no. 39
Unclassified report

Descriptors: (*Control systems, Linear systems), (*Synthesis, Combinatorial analysis), (*Matrix algebra, Theory), Combinatorial analysis, Operators (Mathematics), Polynomials, Equations, Functions, Integral transforms.

AD-415 849 Div. 15
(TISTP/HG) OTS price $1.60

Purdue Research Foundation, Lafayette, Ind.
RETRACTION ONTO DENDRITES,
by A. Lauria and C. J. Naugebauer. Nov 59, 13p.
Technical note no. 18; PRF1203
Contract AF18 600 1484, Proj. 17501
AFOSR TN59 802 Unclassified report

Report on Analytical Theory of Continuous Transformations.

Descriptors: (*Transformations (Mathematics), Functions), (*Topology, Theory), Sequences, Inequalities, Mapping.

AD-415 895 Div. 15
(TISTP/FEM) OTS price $3.60

Purdue U., Lafayette, Ind.
NORMAL OPERATORS ON THE BANACH SPACE $L^p(-\infty, \infty)$.
PART II: UNBOUNDED OPERATORS,
by G. L. Krabbe. 20 Nov 59, 36p.
AFOSR TN59 1212 Unclassified report

Descriptors: (*Functional analysis, Operators (Mathematics)), (*Algebras, Theory), Topology, Functions, Transformations (Mathematics), Measure theory, Integrals, Integral transforms, Equations, Inequalities.

AD-415 933 Div. 15
(TISTP/HG) OTS price $1.60

Israel Inst. of Tech. (Haifa).
PRODUCTS OF AUTOMATA AND THE PROBLEM OF COVERING,
by Abraham Ginzburg and Michael Yoeli. July 63, 17p. Technical rept. no. 15
Contract N62558 3510
Unclassified report

Descriptors: (*Metamathematics, Computers), Algebra, Transformations (Mathematics), Number theory, Sequential analysis, Topology, Convex sets, Tables.

Convenient relational techniques for the description and study of complete or partial, finite or infinite automata is introduced. By associating with every input two binary relations an easy and concise algebraic method for the study of homomorphisms and covering of automata is obtained. (Author)

AD-415 959 Div. 15
(TISTP/HG) OTS price $5.60

Oregon U., Eugene.
BASIC RESEARCH IN PROBABILITY AND STATISTICS OF SEVERAL SAMPLE PROBLEMS.
Final rept., 1 July 61-30 June 63,
by Fred C. Andrews, Donald R. Truax, Robert E. Odeh, James Q. Denton and David Huemer.
31 July 63, 53p.
Contract AF49 638 1057
AFOSR 5230 Unclassified report

Descriptors: (*Statistical analysis, Statistical functions), (*Sampling, Probability), Sequences, Functions, Convex sets, Integrals, Functional analysis, Tables, Inequalities, Polynomials, Measure theory, Statistical tests, Analysis of variance.

AD-415 960 Div. 15
(TISTP/HG) OTS price $1.10

British Columbia U. (Canada).
PROBLEMS ASSOCIATED WITH THE SCHRODINGER OPERATOR.
Final technical rept.,
by C. A. Swanson and C. W. Clark. June 63, 4p.
Grant AF AFOSR61 89
AFOSR 5232 Unclassified report

Descriptors: (*Statistical functions, Operators (Mathematics)), Differential equations, Topology, Green's function, Functions.

AD-415 969 Div. 15
(TISTM/TCG) OTS price $1.60

Research Triangle Inst., Durham, N. C.
ESTIMATION OF THE PROBABILITY THAT AN OBSERVATION WILL FALL IN A SPECIFIED CLASS,
by Walter A. Hendricks. 15 Mar 63, Technical rept. no. 2; SU74
Grant AF AFOSR62 309
Unclassified report

Descriptors: (*Statistical analysis, Probability), (*Probability, Statistical analysis), Theory, Sampling.

AD-415 993 Div. 15
(TISTP/HG) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
APPROXIMATION OF SOLUTIONS OF MIXED BOUNDARY

VALUE PROBLEMS FOR POISSON'S EQUATION BY FINITE DIFFERENCES,
by J. H. Bramble and B. E. Hubbard. July 63, 18p. Technical note BN326
NSF Grant GP3 and AFOSR Grant 62 454
AFOSR Rept. no. 5231 Unclassified report

Descriptors: (*Boundary value problems, Difference equations), (*Partial differential equations, Operators (Mathematics)), Functions, Taylor's series, Inequalities, Errors, Green's functions, Numerical analysis.

AD-415 994 Div. 15
(TISTP/HG) OTS price $4.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
NEW MONOTONE TYPE APPROXIMATIONS FOR ELLIPTIC PROBLEMS,
by James H. Bramble and Bert E. Hubbard. July 63, 37p. Technical note BN327
NSF Grant GP3 and AFOSR Grant 62 454
AFOSR Rept. no. 5237 Unclassified report

Descriptors: (*Partial differential equations, Numerical analysis), (*Boundary value problems, Errors), Operators (Mathematics), Green's functions, Functions, Matrix algebra, Algebra, Series, Inequalities.

AD-416 000 Div. 15, 25
(TISTP/HG) OTS price $9.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ON THE NECESSARY CONDITION FOR OPTIMAL CONTROL OF NONLINEAR SYSTEMS,
by Hubert Halkin. 13 June 63, 110p. Technical rept. no. 116
Contract Nonr22511, Proj. NR041 086
Unclassified report

Descriptors: (*Nonlinear systems, Control), (*Control systems, Functions), (*Differential equations, Topology), Transformations (Mathematics), Measure theory, Geometry, Topology, Linear systems, Numerical analysis, Integrals, Inequalities, Calculus of variations, Matrix calculus, Algebra, Convex sets, Propagation, Perturbation theory, Trajectories.

AD-416 005 Div. 15
(TISTP/HG) OTS price $1.10

Institute for Advanced Study, Princeton, N. J.
(No title).
Technical status rept. for 1962-1963. 1963, 2p.
Contract AF49 638 253, Proj. 9783
AFOSR 5226 Unclassified report

Descriptors: (*Bibliographies, Mathematics), (*Research program administration, Scientific research), Groups (Mathematics), Algebraic topology, Geometry, Algebras.

AD-416 050 Div. 15
(TISTP/MFA) OTS price $2.60

Research Triangle Inst., Durham, N. C.
PAIRED-COMPARISON EXPERIMENTS INVOLVING FIVE RESPONSE CLASSES,
by William A. Glenn. 29 Mar 63, 21p. Technical rept. no. 3; Rept. no. SU74
Grant AF AFOSR62 309
AFOSR 5035 Unclassified report

Descriptors: (*Probability, Statistical analysis), Least squares method, Sampling, Statistical tests, Statistical processes.

A paired comparison is made by presenting two treatments to a judge who is asked to choose the one that he considers the better on the basis of some common characteristic. For example, the treatments may be two blends of coffee and the comparison consists of selecting the blend with the better flavor. A paired-comparison experiment involves the pairwise comparisons of two or more treatments by one or more judges. It is proposed to extend the method of Glenn and David to cover paired-comparison experiments involving five response classes. This will be accomplished by making the assumptions that a tie will occur whenever the difference between the judge's responses to two stimuli under comparison lies below a first threshold, a mild preference will be declared whenever the difference lies between the first threshold and a second threshold, and a strong preference will be declared when the difference exceeds the second threshold. There will thus be five admissible response classes, viz. the two mild-preference classes, the two strong-preference classes, and the no-preferences (or ties) class. (Author)

AD-416 118 Div. 15
(TISTP/JP) OTS price $6.60

Copenhagen U. (Denmark).
SINGLE SAMPLING INSPECTIONS PLANS WITH SPECIFIED ACCEPTANCE PROBABILITY AND MINIMUM COSTS,
by A. Hald. July 63, 68p.
Contract N62558 3073, Proj. NR042 225
Unclassified report

Descriptors: (*Sampling, Quality control), Probability, Games theory.

To design an economical sampling plan it is necessary to know the costs of sampling inspection, the costs of wrong decisions, and the quality distribution of lots submitted for inspection, the prior distribution. Sometimes it is impossible to specify the prior distribution in detail but a vague knowledge is available which means that not enough is known/for the minimax solution to be satisfactory. The problem then is to choose a third principle leading to a reasonable solution. The principle used in the present paper is to specify the acceptance probability for one quality level and minimize the costs of another quality level. (Author)

AD-416 315 Div. 15, 2
(TISTP/MFA) OTS price $8.10

Ohio State U., Columbus.
ERROR ANALYSIS OF A TRILATERATION NETWORK WITH AND WITHOUT THE LAPLACE CONDITION,
by William Arthur DeLoach, Jr. 1963, 84p.
Unclassified report

Master's thesis.

Descriptors: (*Errors, Analysis), (*Geodesics, Equations), (*Position finding, Measurement), Networks, Earth, Trigonometry, Matrix algebra, Tables.

AD-416 361 Div. 15
(TISTP/MH) OTS price $1.60

Aarhus U. (Denmark).
INVESTIGATIONS ON FLUCTUATIONS OF SUMS OF RANDOM VARIABLES.

Final rept.,
by E. Sparre Andersen. 15 July 63, 13p.
Contract AF61 052 42
AFOSR 5251 Unclassified report

Descriptors: (*Statistical distributions, Sequences), Polynomials, Matrix algebra, Functions.

We have investigated the fluctuations of sume of random variables X1, X2,. We have generalized previous results on the random variables Hn connected with this sequence, obtained new results on the validity of the Arc-sine Law for independent not identically distributed random variables, obtained a generalization of Spitzer's identity, and obtained a generalization of the equivalence principle. Furthermore Toeplitz matrices of Laurent polynomials have been studied. For the growth of the maximal order statistics of a sequence of independent, identically distributed random variables a ''Law of the iteratedlogarithm'' has been obtained. (Author)

AD-416 364 Div. 15
(TISTP/HG) OTS price $4.60

University Coll., Cork (Eire).
NON-LINEAR BENDING OF AN ANNULAR PLATE, II. INTEGRATION OF REISSNER'S AND VON KARMAN'S EQUATIONS,
by Vincent G. Hart. June 63, 44p. Technical rept. no. 3
Grants AF EOAR61 4 and AF EOAR63 64
AFOSR 5164 Unclassified report

Descriptors: (*Nonlinear differential equations, Integration), *Taylor's series, Series, Numerical analysis, Functions, Transformations (Mathematics), Numerical methods and procedures, Tables, Digital computers, Stresses, Pressure, Rings, Differential equations.

Concern is with the equilibrium of a thin annular plate bent out of its initial plane by transverse edge forces. The results of integrating the governing non-linear differential equations of Reissner are compared with the results of integrating von Karman's equations for this problem. (Author)

AD-416 405 Div. 15
(TISTB/AAR) OTS price $4.60

Institute for Research, State College, Pa.
MEASUREMENT OF SUBJECTIVE PROBABILITY DISTRIBUTIONS,
by Masanao Toda. July 63, 34p.
Contract AF19 628 2968, Proj. 4690, Task 469003
ESD TDR63 407 Unclassified report

Descriptors: (*Probability, Distribution), Measurement, Game theory, Decision making, Mathematical analysis.

Five experimental one-person games are derived which promise both valid and efficient measurement of discrete and continuous subjective probability distributions. All of these games possess the characteristic that it is to the disadvantage of the decision maker to respond in a manner inconsistent with his actual expectations. The measurement procedures are efficient and rapid. It appears that some of the procedures could be used to measure continuously changing subjective probabilities. (Author)

AD-416 409 Div. 15
(TISTP/MFA) OTS price $1.10

Lincoln Lab. Mass. Inst. of Tech., Lexington.
CYCLOTOMIC FIELDS AND THEIR REAL SUBFIELDS.
9 Aug 63, 3p. Rept. no. 66G1
Contract AF19 628 500
Unclassified report

Descriptors: (*Number theory, Analysis), Algebra.

AD-416 417 Div. 15, 5
(TISTP/MFA) OTS price $2.60

Maryland U., College Park.
SUMMARY OF ''THEORIE ANALYTIQUE DES PROBLEMES STOCHASTIQUES RELATIFS A UN GROUPE DE LIGNES TELEPHONIQUES AVEC DISPOSITIF D'ATTENTE'',
by Felix Pollacyek. June 63, 26p. Technical note BN323
Contract Nonr595 17 and Grant DA ARO D31 124G134
AROD 407 62 Unclassified report

Descriptors: (*Queueing theory, Probability), (*Telephone lines, Communication theory), Distribution theory, Stochastic processes, Polynomials, Integral transforms, Functions, Simultaneous equations, Complex variables.

AD-416 445 Div. 15
(TISTP/WH) OTS price $1.10

Virginia U., Charlottesville.
RESEARCH IN TOPOLOGY AND MATHEMATICAL ANALYSIS, Technical status rept. no. 8, 1 June 62-31 May 63,
by G. T. Whyburn. 7 June 63, 2p.
Contract AF49 638 72
Unclassified report

Descriptors: (*Research program administration, Topology), (*Topology, Research program administration), (*Mathematical analysis, Research program administration).

AD-416 483 Div. 15
(TISTP/HG) OTS price $7.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A NUMERICAL SOLUTION OF A SYSTEM OF LINEAR INTEGRO-PARTIAL DIFFERENTIAL EQUATIONS,
by Virginia Palm Nather. 17 Apr 61, 67p. Rept. no. GA2073
Contract AF29 601 2207, Proj. 52
Unclassified report

Master's thesis.

Descriptors: (*Partial differential equations, Numerical analysis), (*Difference equations, Real variables), Errors, Functions, Fourier analysis, Series, Taylor's series, Operators (Mathematics), Programming (Computers), Tables, Algebra.

The numerical solution to a system of linear integro-partial differential equations is treated. A numerical solution to the system was obtained

by using difference approximations to the partial differential equations. To assure convergence, a stability condition derived from the related plate equation was assumed. Definitions and theorems relevant to the choice of the stability condition for the system are presented in an examination of the heat equation. The numerical work was carried out by a series of programs on the IBM-704 computer. Results were obtained for the cases of constant and variable coefficients, and a comparison was made between results for the plate equation (uncoupled system) and for the entire system. It was found that the stability condition heuristically assumed is satisfactory. The results obtained appear to represent a real solution to the system. (Author)

16. MEDICAL SCIENCES

AD-415 613 Div. 16
(TISTM/ODN) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONTINUATION OF FACTORS AFFECTING WATER PURIFICATION,
by Lester Baribo. Dec 57, 9p.
Proj. 7955 16
AAL TN57 5 Unclassified report

Descriptors: (*Water, Purification), Colloids, Silver, pH, Temperature, Escherichia, Calcium compounds, Iron compounds, Ions.

The effects of pH on the action of various chemicals tested with respect to organism destruction are shown. Lowering the pH enhanced the action of chlorine and iodine. The result with colloidal silver indicated no effect of pH at low concentrations but high concentrations showed complete inhibition of the organisms. The effect of temperature on the action of colloidal silver is shown. As the temperature increased from 0 to 37 C. there was a marked increase in the inhibitory properties of colloidal silver. (Author)

AD-415 614 Div. 16
(TISTB/WA) OTS price $6.60

Research Triangle Inst., Durham, N. C.
SHELTER MEDICAL SUPPORT SYSTEM STUDY.
Final rept.,
by W. T. Herzog, W. L. Wells and W. J. Cromartie.
31 Aug 63, 61p. Rept. no. OU107
Contract OCD OS62 271, Proj. 1341A
Unclassified report

Descriptors: (*Shelters, Medical supplies), (*Civil defense systems, Shelters), Medical personnel, Radioactive fallout, Survival, Communication systems, Transportation, Mathematical models.

Part I studies various policies of allocating medical resources (manpower and material) in an area network of public fallout shelters during a post-nuclear emergency period of two weeks. It is concluded that a policy of assigning medical resources to large shelters is superior to concentrating them in hospitals or treatment centers. The near optimal strategy requires dispersal of physicians in high PF shelters, because of their potential value in the post-shelter period. In fallout only environments, medical support of the population would place minimal demands on the transportation, shelter management, and warning systems. Demands on the communications system are likely to be excessive. Recommendations of additional research for medical planning are included. Part II includes background data essential for the measures of effectiveness used in Part I. (Author)

AD-415 666 Div. 16
(TISTM/BRW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NUCLEIC ACIDS AND EVOLUTION IN ALGAE.
by G. P. Serenkov. 6 May 63, 18p.
FTD TT63 421 Unclassified report

Trans. from Izvestiya Akademii Nauk SSSR, Seriya Biologicheckaya, no. 6, pp. 857-868, 1962.

Descriptors: (*Algae, Nucleic acids), (*Nucleic acids, Algae), Plants (Botany), Nitrogen, Phosphorus, Determination, Chemical analysis, Nucleotides, Purines, Pyrimidines.

AD-415 672 Div. 16
(TISTM/REB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMBINED EFFECT OF VIBRATION AND NOISE ON THE HUMAN ORGANISM,
by A. A. Arkad'yevskiy. 22 Apr 63, 7p.
FTD TT63 292 Unclassified report

Trans. from Gigiyena i Sanitariya, no. 10, pp. 25-28, 1962.

Descriptors: (*Brain, Vibration), (*Noise, Brain), (*Spinal cord, Noise), (*Vibration, Spinal cord), Physiology, Medium frequency, Electrocardiography, Audiometry, Motor reactions.

Individual effect of noise of medium frequency spectrum with an intensity of 85 db and general vibration of a frequency of 50 c and amplitude of 15 microns causes no expressed displacement in physiological reactions. Combined effect of these factors of very same parameters intensify the physiological displacement of the investigated functions, but this displacement does not go beyond the limits of normal organismal adaptation. (Author)

AD-415 707 Div. 16, 1
(TISTB/AAR) OTS price $1.10

Bell Helicopter Co., Fort Worth, Tex.
DETECTION OF ANGULAR CHANGE IN A GRID LINE DISPLAY.
Technical data,
by George A. Fox. 9p. Rept. no. D228 420 001
Contract Nonr167000
Unclassified report

Descriptors: (*Display systems, Motion), Pattern recognition, Performance tests, Psychology, Tests, Vision, Pilots, Visual acuity, Detection, Rotation, Design.

AD-415 818 Div. 16
(TISTB/AAR) OTS price $6.60

Ohio State U., Columbus.
A CLINICAL AND HISTOLOGICAL COMPARISON OF WOUND HEALING FOLLOWING TWO TYPES OF MUCOGINGIVAL SURGERY ON RHESUS MONKEYS,
by George William Greco. 1963, 60p.
Unclassified report

Master's thesis.

Descriptors: (*Wounds & injuries, Healing), (*Mouth, Surgery), Primates, Tissues (Biology), Medical research, Medicine, Histology, Laboratory animals.

AD-415 930 Div. 16
(TISTB/AAR) OTS price $3.60

Maryland U. School of Medicine, Baltimore.
THE ORIGIN AND UTILIZATION OF AMMONIA IN SHOCK.
Final technical rept. 1 Oct 55-30 Sep 62,
by R. Adams Cowley. 30 Sep 62, 31p.
Contract DA49 007 674
Unclassified report

Descriptors: (*Shock (Pathology), Therapy), Ammonia, Medicine, Medical research, Hemorrhage, Therapy, Tissues, Hypoxia, History, Metabolism, Blood circulation.

Mechanism in various states of shock were studied; hemorrhagic, septic, cardiogenic and strangulation obstruction. Metabolic acidosis was common to all. Ammonia increased early in the portal venous blood and peritoneal fluid and late in systemic circulation. Ammonia metabolic disruption probably is a consequence and not a contributory cause of irreversibility. The Fine preparation was too severe for therapeutic assay. An LD50 preparation was developed and is the standard University of Maryland model. Tissue hypoxia is a common denominator of pathophysiology regardless of the shock type and may be the ultimate responsible deficit for irreversibility. Therapeutic regimens explored included hypothermia, partial by-pass, balanced electrolyte solutions, mitochondria, infusion, aldosterone and hyperbaric oxygenation. On the basis of this experimental work, the following clinical applications evolved: Hypothermia in cardiac surgery and septic shock; ammonia in peritoneal fluid as useful test in the differential diagnosis of acute abdomen; aldosterone in preference to vasopressors in shock; hyperbaric oxygen in hemorrhagic shock. (Author)

AD-415 948 Div. 16
(TISTB/AAR) OTS price $1.60

Texas Nuclear Corp., Austin.
DEVELOPMENT OF AN APPARATUS FOR PARTIAL CELL IRRADIATION,
by Ira L. Morgan, Loy D. England, Robert L. Launer, William E. Tucker, and Joseph S. Pizzuto.
June 63, 11p.
Contract AF41 657 291, Task 775702
SAM/B TDR63 26 Unclassified report

Descriptors: (*Laboratory equipment, Radiobiology), (*Proton accelerator), Cells (Biology), Radiation effects, Tissue culture, Protons, Energy, Proton beams.

An apparatus has been developed which allows 16 Mev proton irradiation of selected areas of single living biologic cells cultured in vitro. The highly collimated proton microbeam passes through the tissue culture and is monitored as to number and energy of protons. Extrapolation of individual proton energies allows determination of the energy loss in the tissue. Specific advances, over earlier work in partial cell and microbeam irradiation, include the collimation of 16 Mev protons, cellular alignment technic, and special monitoring methods. (Author)

AD-416 225 Div. 16, 28
(TISTB/WA) OTS price $2.60

Biotechnology Lab., U. of Calif., Los Angeles.
UPPER EXTREMITY PROSTHETICS RESEARCH. HUMAN TRACKING. SENSORY MOTOR CONTROL.
Progress rept.,
by John Lyman. 15 June 63, Rept. 63 33
Contract N123 60530 23558A and Grant OVR Rd1201M63
Unclassified report

Descriptors: (*Prosthetics), Feasibility studies, Design, Effectiveness, Prosthetics, Thermodynamics, Tracking, Human engineering, Errors.

AD-416 363 Div. 16
(TISTB/CCH) OTS price $4.60

Keele U. (Gt. Brit.).
NEW METHODS OF ANALYSIS OF ELECTROPHYSIOLOGICAL RESPONSES,
by Donald M. Mackay, D. Aled Jeffreys, and Richard R. Glover. 21 June 63, 1v.
Contract AF EOAR62 23
AFOSR 5257 Unclassified report

Descriptors: (*Bone, Electrical properties), (*Vision, Pathology), Pattern recognition, Magnetic tape.

This report described a further year's work on the magnetic-tape averaging system. Effort has been devoted mainly to improving circuitry and developing auxiliary equipment, but a number of experiments on the occipital response to changes in visual pattern are also reported. (Author)

AD-416 372 Div. 16, 28
(TISTB/AAR) OTS price $1.60

Paris U. (France).
NERVOUS PROCESSES IN BEHAVIOR AND LEARNING.
Final technical rept., 1 May 61-30 Apr 63.
30 Apr 63, 16p.
Contract AF61 052 475
AFOSR Rept. no. 5256 Unclassified report

Descriptors: (*Nervous system, Behavior), (*Learning, Nervous system), Neurology, Physiology, Psychology, Cells (Biology), Inhibition, Acetylcholine, Control, Cerebellum.

AD-416 428 Div. 16
(TISTM/REB) OTS price $1.10

Weizmann Inst., Israel.
MECHANISM OF PHOTOPHOSPHORYLATION IN CHLOROPLASTS.
Final technical rept.,
by Mordhay Avron. 26 May 63, 8p.
Grant AF EOAR62 59
AFOSR Rept. no. 5254 Unclassified report

Descriptors: (*Phosphorylation, Plants (Botany), (*Plants, Phosphorylation), (*Photochemistry, Phosphorylation), Photosynthesis, Adenosine phosphates, Dyes, Oxygen, Ultraviolet radiation, Potassium compounds, Iron compounds, Cyanides, Enzymes, Chemical analysis, Biochemistry, Labeled substances.

The exchange between ADP and ATP found in chloroplasts was concluded to be unrelated to the process of photophosphorylation. Photophosphorylation coupled to the reduction of indophenol dyes was demonstrated. The complex role of indophenol dyes in inhibiting, eliciting, or bring about lag periods in photophosphorylation reactions was clarified. Previous studies on the path of oxygen atoms in photophosphorylation were extended. The effect of irradiating

chloroplasts with uv light on their photochemical activity was studied. A sensitive method for measuring the reduction of ferricyanide in photochemical and other enzymatic reactions was developed. A factor which specifically restores the ability to phosphorylate, was isolated from chloroplasts. (Author)

AD-416 441 Div. 16, 30
(TISTB/WA) OTS price $2.60

Naples U. (Italy).
RESEARCH ON STRUCTURE AND FUNCTION OF NERVE NETS.
Technical final rept.,
by V. Braitenberg. 1 May 63, 23p.
Grant AF EOAR62 8
AFOSR Rept. no. 5182 Unclassified report

Descriptors: (*Nerve cells, Histology), (*Biophysics, Cerebral cortex), Models (Simulations), Networks, Anatomy, Theory, Input-output devices, Pattern recognition, Statistical processes, Histology, Functional analysis.

17. METALLURGY

AD-415 619 Div. 17
(TISTM/REB) OTS price $1.75

Technische Hochschule, Munich (Germany).
INVESTIGATION OF THE DISTRIBUTION OF TENSILE AND BENDING STRESSES IN NOTCHED FLAT BARS.
Report for 1961-1962,
by H. Neuber. July 63, 59p. Rept. no. 60 906
Contract AF61 052 200, Proj. 7351, Task 735106
ASD TDR63 515 Unclassified report

Report on Metallic Materials.

Descriptors: (*Metal plates, Stresses), Fatigue (Mechanics), Tensile properties, Deformation, Theory, Tests, Elasticity, Functions, Partial differential equations, Harmonic analysis, Strain (Mechanics).

The treatment of stress concentration in plates of arbitrary thickness is outlined. By means of the author's ''Three functions set'' the complete solution for these problems can be established. The usual stress functions are to be extended by additional functions in order to fulfill the complete boundary conditions in flat bar problems as well as in plate bending problems. Results of the theory are given for infinite flat bars in tension and plates in bending with a circular hole. The results of static and fatigue tests with notched specimens are given. Static tests were performed with medium thick plates containing a pair of semicircular notches in transverse bending. Stress- and strain distributions in the elastic and plastic range respectively and the dependence of the stress concentration factor on the nominal stress are given. Push-pull fatigue tests had been carried out to study the influence of stress concentration on the fatigue strength. (Author)

AD-415 635 Div. 17, 25
(TISTM/BRW) OTS price $1.60

Army Materials Research Agency, Watertown, Mass.
THE ORIGIN OF THE ''INVAR'' EFFECT,
by R. J. Weiss. June 63, 15p. MRL Rept. 133
DA Proj. 1H0 24401A110
AMRA TR63 07 Unclassified report

Descriptors: (*Iron alloys, Crystal lattices), (*Nickel alloys, Crystal lattices), Transition elements, Atomic energy levels, Atomic orbitals, Selection rules, Electron transitions, Brillouin zones, Mossbauer effect, Excitation, Antiferromagnetism, Ferromagnetism.

The ideas of two electronic configurations of iron atoms in a f.c.c. lattice are extended to the iron-nickel alloy system. With a reasonable variation of the energy difference of these two configurations with nickel concentration it is shown that invar originates from the thermal excitation of the configuration with lower atomic volume in opposition to the normal anharmonic source of expansion. The anomalous pressure dependence of the Vurie temperature and the variation of Curie temperature with concentration for alloys containing 30 to 60% Ni are also shown to follow. (Author)

AD-415 646 Div. 17, 25
(TISTM/BRW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ABSORPTION OF GASES BY ACTIVE METALS,
by G. D. Glebov. 13 Mar 63, 18p.
FTD TT62 1764 Unclassified report

Trans. from Pogloshcheniye Gazov Aktivnymi Metallami, Gosudarstvenneye Energeticheskoye Isdatel'stvo, Moskva, Leningrad, pp. 157-173, 1961.

Descriptors: (*Metals, Absorption), (*Gases, Absorption), Niobium, Tantalum, Hydrogen, Solubility, Solid solutions, Hydrides, Niobium compounds, Tantalum compounds, Oxides, Nitrides, Carbides, Crystal lattices, Thermodynamics, Melting, Temperature, Enthalpy, Entropy, Specific heat, Molecular properties, Carbon compounds.

AD-415 700 Div. 17, 25
(TISTM/BRW) OTS price $3.60

Manufacturing Labs., Inc., Cambridge, Mass.
DISLOCATIONS AND PLASTIC BEHAVIOR OF IRON SINGLE CRYSTALS,
by Paul J. Fopiano. Apr 61, 27p.
Contract AF33 616 6348, Proj. 7021, Task 73653
WADD TR61 145 Unclassified report

Descriptors: (*Single crystals, Iron), (*Iron, Single crystals), Crystal lattice defects, Plasticity, Metallography, Crystal growth, Recrystallization, Deformation, Strain (Mechanics), Heat treatment, Crystal substructure, Cold working, Rolling (Metallurgy), Forging, High temperature research, X-ray diffraction analysis, Vacuum furnaces, Controlled atmospheres, Mechanical properties, Silicon alloys, Iron alloys, Impurities, Tensile properties, Crystal structure, Stresses, Elasticity, Creep, Manganese, Sulfur.

The factors affecting the growth of iron single crystals by the strain anneal method were of continuing interest. The metallography and etch pitting of annealed and strained single crystal specimens were developed and shown to give consistent results. X-ray and etch pitting techniques showed quantitative agreement. The double crystal spectrometer is felt, however, to be of most interest in this program. Furthermore, the desirability of being able to follow the effect of strain on the rocking curve of one particular area of an iron single crystal has led to the construction of a tensile apparatus capable of being mounted directly on the double crystal spectrometer. The methods and results of employing this technique are discussed in considerable detail. The analysis of these results based on a dislocation model is presented. (Author)

AD-415 874 Div. 17, 25
(TISTM/AMS) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
SIZE EFFECT IN POLYCRYSTALLINE INDIUM PLATES IN A MAGNETIC FIELD,
by J. G. Daunt. Aug 63, 5p. Technical rept. no. 9
Contract N6onr49520, Proj. NR018 412; 989
Unclassified report

Descriptors: (*Indium, Magnetic properties), (*Films, Indium), Magnetic fields, Resistance (Electrical), Thickness, Hall effect, Crystals, Metal plates, Metal films.

AD-415 877 Div. 17, 25
(TISTM/BRW) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
MAGNETIC PROPERTIES OF CUPRON WIRE AT LOW

TEMPERATURES,
by J. G. Daunt. July 63, 4p. Technical rept. no. 8
Contract N6onr49520, Proj. NR018 412; 989
Unclassified report

Descriptors: (*Magnetic alloys, Wire), (*Copper alloy, Magnetic properties), Nickel alloys, Low-temperature alloys, Cryogenics, Electrical conductance, Thermal conductivity, Magnetic moments, Magnetic fields, Ferromagnetic materials, Ferromagnetism, Paramagnetic materials, Transition temperature, Measurement.

AD-415 932 Div. 17, 12
(TISTM/AW) OTS price $19.75

Budd Co., Philadelphia, Pa.
DEVELOPMENT OF HIGH PERFORMANCE ROCKET MOTOR CASE.
Final summary rept. no. 23, 21 June 60-30 Nov 62,
by R. C. Dethloff. 30 Nov 62, 245p.
Contract DA36 034ORD3296, Proj. OMS5010 1180800 51 03
Unclassified report

Descriptors: (*Rocket cases, Alloys), Steel, Stainless steel, Titanium alloy, Martensite, Aging (Materials), Pipes, Welding, Mechanical properties, Tensile properties, Data, Rolling, Cold working, Stresses, Corrosion, Cylindrical bodies, Hydrostatic pressure, Pressure vessels, Processing, Heat treatment, Density, Thermal joining, Physical properties, Dispersion hardening, Hardness.

The results of work performed during the contract period June, 1960 to November, 1962 on the development of a high performance rocket motor case using high strength sheet and strip metal are discussed. Metallurgical evaluation of 12 ferrous and nonferrous alloys; selection of 20% nickel mar-aging steel for application to case; design of a 20 inch diameter by 40 inch long test case; development of a helical welding technique for fabricating cylinders from strip; development of a process to form hemispherical and elliptical heads from low elongation alloys; fabrication and hydrotest of a 20 inch test case; unidirectional ingot solidification of AISI 4340 and 25% nickel mar-aging steels are summarized.

AD-416 119 Div. 17
(TISTM/BRW) OTS price $.50

Army Materials Research Agency, Watertown, Mass.
LOW TEMPERATURE MECHANICAL PROPERTIES OF BASE AND WELD DEPOSITS OF SELECTED AUSTENITIC STAINLESS STEELS,
by Thomas S. DeSisto. July 63, 13p.
Proj. 1HO 24401A110
AMRA TR63 08 Unclassified report

Report on Materials for Army Weapons and Combat Mobility.

Descriptors: (*Stainless steel, Mechanical properties), (*Metal plates, Stainless steel), Cryogenics, Low temperature research, Strain (Mechanics), Stresses, Impact shock, Tensile properties, Welding, Welds, Austenite, Toughness, Low temperature alloys, Fracture (Mechanics).

Mechanical properties of types 301, 316, and 347 stainless steels in plate form were studied from room temperature down to -269 C. Both the base metal and weld deposits were tested. Charpy, true stress-strain, and notched tensile properties were examined. The effect of testing temperature upon the tensile strength, elongation, reduction of area, true stress at maximum load, true stress at fracture, uniform strain, fracture strain, and notched strength ratio is illustrated. Companion data for Charpy impact energy are also included. The 310 and 316 alloys are shown to be insensitive to notches at low temperature, whereas the 301 and 347 alloys are notch sensitive. (Author)

AD-416 199 Div. 17
(TISTM/BRW) OTS price $3.60

Battelle Memorial Inst., Columbus, Ohio.
FURTHER DEVELOPMENT OF A DUCTILE TUNGSTEN-BASE SHEET ALLOY.
Quarterly progress rept. no. 2, 30 May-8 Aug 63,
by J. L. Ratliff, D. J. Maykuth, H. R. Ogden and R. I. Jaffee. 30 Aug 63, 24p.
Contract N60019 59738
Unclassified report

Descriptors: (*Tungsten alloys, Ductility), (*Sheets, Tungsten alloys), Rhenium alloys, Thorium compounds, Zirconium compounds, Oxides, Powder metallurgy, Sintering, Recrystallization, Grain structures (Metallurgy), Brittleness, Transition temperature, Refractory metals & alloys, Tungsten, Powder alloys, Powder metals, Materials forming, Rolling (Metallurgy).

Two groups of alkali-silicate doped alloys were prepared to screen the effects of doping additions and processing conditions on the structure of otherwise unalloyed tungsten. Alloy compositions for the two groups of materials included unalloyed controls and both experimentally and commercially doped (Type 218) alloys. From the results of evaluations conducted on these materials, the Type 218 powder was selected as the base material for the subsequent development of W-5Re-(ThO2/ZrO2) alloys. (Author)

AD-416 244 Div. 17, 25
(TISTM/AMS) OTS price $3.60

Rias, Inc., Baltimore, Md.
FORMATION OF STACKING FAULTS IN POLYCRYSTALLINE SILICON BRONZE UNDER TENSILE DEFORMATION,
by H. M. Otte and D. O. Welch. Sep 63, 31p.
Contract Nonr370600
ONR TR6 Unclassified report

Descriptors: (*Bronze, Silicon alloys), (*Silicon alloys, Bronze), (*Crystal lattice defects, Bronze), Copper alloys, X-ray diffraction analysis, Stresses, Manganese alloys, Anisotropy, Crystal lattice, Electron microscopy, Tensile properties.

AD-416 275 Div. 17, 25
(TISTM/AMS) OTS price $3.60

Michigan U. Coll. of Engineering, Ann Arbor.
INVESTIGATION OF LIQUID METAL BOILING HEAT TRANSFER.
Quarterly progress rept. no. 4,
by Richard E. Balzhiser, Robert E. Barry, C. Phillip Colver, Herman Merte, Jr. and Andrew Padilla, Jr. Feb 63, 1v.
Contract AF33 616 8277, Proj. 04526
ASD Technical rept. no. 61 594; AEC NP12699
Unclassified report

Descriptors: (*Liquid metals, Boiling), (*Boiling, Liquid metals), (*Heat transfer, Liquid metals), Potassium, Films, Lithium,

Sodium, Rubidium, Mathematical analysis, Equations, Gamma rays, Laboratory equipment, Test equipment, Temperature, Surface properties, Boilers, Alkali metals.

Virtually all phases of the project have reached operational stages. The high flux nucleate pool boiler has been subjected to preliminary check out procedures during which water was pool boiled at fluxes from 20,000 to 500,000 Btu/(hr)(sq.ft.). The results checked well with previous data from a 3/8-in. OD tube. Construction of the film boiler is essentially complete and check out proceedings with water are expected to commence within the next week. The liquid metal loop has been received from Mine Safety Appliance. It will be housed in a new facility constructed by the University of Michigan for liquid metal research. Installation procedures are almost complete and preliminary check out is expected to begin next week. Progress on the analytical studies of the film boiling process have progressed during the last reporting period. Preliminary results from this study are discussed in this report and calculated minimum fluxes for several alkali metals have been tabulated. (Author)

AD-416 377 Div. 17, 26
(TISTM/BRW) OTS price $1.60

IIT Research Inst., Chicago, Ill.
DEVELOPMENT AND APPLICATION OF A THEORY FOR PLASTIC DEFORMATION OF CEMENTED ALLOYS TASK 1
ZONE REFINING OF CEMENTED TUNGSTEN-BASE ALLOYS.
Quarterly rept. no. 7, 1 Oct-31 Dec 62,
by N. M. Parikh. 30 Jan 63, 8p.
Contract DA11 022 505ORD3092, Proj. nos. TB4 002 and 5B93 32 002
WAL TR372 32 7T1 Unclassified report

Descriptors: (*Tungsten alloys, Zone melting), (*Refractory metals and alloys, Material forming), Iron alloys, Nickel alloys, Rolling (Metallurgy), Cold working, Hot working, Refining (Metallurgy), Ductility, Powder metallurgy, Sintering.

Several bars of 96W-4(7Ni-3Fe) alloys were sintered, rolled, and zone refined. Zone refining was accomplished at 3812 F and the resultant bars had very low residual matrix content. The zone-refined bars were then hot rolled at 2966 F and hot-cold rolled down to 1922 F. Some of the mechanical properties of these bars have been determined and are compared with those of the commercial materials. (Author)

AD-416 403 Div. 17
(TISTM/BRW) OTS price $1.60

IIT Research Inst., Chicago, Ill.
ZONE REFINING OF CEMENTED TUNGSTEN-BASE ALLOYS.
Quarterly rept., 1 Jan 1-31 Mar 63,
by N. M. Parikh. 16 May 63, 10p.
Contract DA11 022 505ORD3092, Projs. TB4 002 and 5B93 32 022
WAL TR372 32 8T1 Unclassified report

Report on development and application of a theory for plastic deformation of cemented alloys.

Descriptors: (*Tungsten, Sheets), (*Tungsten alloys, Zone melting), Refractory metals and alloys, Refining (Metallurgy), Nickel alloys, Iron alloys, Sintering, Rolling (Metallurgy), Hot working, High temperature research, Tensile properties, Transition temperature, Cold working, Ductility, Microstructure, Powder metallurgy.

Current work shows that the processing conditions employed in sintering and rolling W-Ni-Fe alloys, zone refining and hot rolling the sheet bars, result in pure tungsten sheets which have mechanical properties comparable to those of commercial sheets. The sheet bars were zone refined at temperatures from 3800 to 4400 F and hot-cold rolled down to sheets 0.064 in. thick. Properties of the sheets measured were transition temperature and high-temperature tensile properties. (Author)

AD-416 457 Div. 17, 25
(TISTM/BRW) OTS price $2.60

Naval Research Lab., Washington, D. C.
CHARACTERIZING FRACTURES BY ELECTRON FRACTOGRAPHY, PART XII, ILLUSTRATED GLOSSARY, SECTION 1: QUASI-CLEAVAGE,
by C. D. Beachem, B. F. Brown and A. J. Edwards.
June 63, 20p.
NRL Memorandum rept. no. 1432
Unclassified report

Descriptors: (*Fractography, Electron microscopy), (*Fracture (Mechanics), Steel), Stainless steel, Tool steel, Martensite, Creep, Rupture, Brittleness, Microstructure, Low temperature research, Cryogenics.

This report is one of a series intended to illustrate and explain the terminology used in describing the features in high magnification fractographs. Quasi-cleavage is one of several fracture modes possible in the mechanical rupturing of quenched and tempered (martensitic) steels. The high magnification surface topography in this fracture mode resembles true cleavage in that the fracture facets are relatively flat with markings which often, though weakly, resemble river patterns in true crystallographic cleavage. In addition to the steps which produce these markings, there are also 'tongues' (cleavage on secondary planes) which strongly resemble true cleavage. But in addition there are, in quasi-cleavage, ridges produced by plastic deformation and rupture of thin webs of metal between two growing submerged crack fronts; these markings do not resemble true cleavage. (Author)

AD-416 459 Div. 17
(TISTM/EJH) OTS price $5.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
DESIGN DATA STUDY FOR COATED COLUMBIUM ALLOYS.
Bimonthly rept. no. 2, 1 May-1 July 63,
by J. D. Gadd and D. B. Warmuth. 1 Aug 63, 53p.
Rept. no. TM3770 67
Contract NOw63 0471
Unclassified report

Descriptors: (*Niobium alloys, Refractory coatings), (*Refractory coatings, Niobium alloys), Refractory metals & alloys, High temperature research, Mechanical properties, Oxidation, Sheets, Low pressure research, Design, Data.

A series of preliminary evaluation tests were conducted with Pfaudler and TRW protective coatings on 30 mil B-66 and X-110 columbium alloy sheet. Two modified silicide coatings applied by one and two-cycle Pfaudler coating processes

and the TRW Cr-Ti-Si coating were comparatively evaluated on the two alloys, prior to initiation of the Design Data Study. Data are presented from one atmosphere cyclic oxidation tests of the six coating-base metal systems at 1600, 2000, 2300, and 2600 F. The influence of elevated temperature-reduced pressure exposure on the various coating systems was studied for 1 and 2 hour 2500 F exposures at 10 to the -1st power and 1 mm pressures. Post oxidation in air at 2600 F was utilized as the criteria for evaluating reduced pressure coating degradation. Room temperature bend ductility data are presented for tests on as coated sheet an on coated sheet after cyclic oxidation for 100 hours at 2000 F and 4 hours at 2600 F. Smooth and notch tensile data are reported for tests performed on uncoated and coated sheet at room temperature and 1200 F. The tensile behavior of coated B-66 and X-110 alloys is discussed relative to that of previously studied FS-85 columbium alloy. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-415 680 Div. 18, 30
(TISTB/AAR) OTS price $7.60

IIT Research Inst., Chicago, Ill.
ANALYSIS OF CONVECTION COLUMN ABOVE A FIRE STORM
Final rept.,
by H. J. Nielsen, Liang Tao and Ludwig Wolf.
1 Aug 63, 56p.
Contract OCD OS62 82, Proj. A6004
Unclassified report

Descriptors: (*Storms, Fires), (*Fires), Civil defense systems, Environmental tests, Analysis, Velocity, Temperature, Convection, Computers.

To determine the environmental conditions within a fire storm, an analytical model was developed which describes the variations with altitude of velocity, temperature, and gas composition within the convection column over a burning area. The analysis is based on an integral method and represents an extension of previous analyses of bouyant plumes to include the effects of combustion and composition variations within the column, and radiation losses from the hot gases. Computer solutions are presented showing the effects on the column of burning area, entrainment coefficient, lapse rate of the atmosphere, and fuel supply rate. The nature of the analysis makes the results inapplicable to prediction of conditions at ground level. Refinements in the theory are suggested for extension of the range of validity to ground level. (Author)

AD-415 730 Div. 18
(TISTM/BRW) OTS price $8.10

Bureau of Supplies and Accounts, Navy Dept., Washington, D. C.
LOW DEMAND INVENTORY MODELS.
July 61, 78p.
Unclassified report

Descriptors: (*Logistics, Navy), (*Naval procurement, Material control), Supply depots, Transportation, Mathematical models, Naval equipment.

A set of detailed mathematical models is developed for items that are demanded one at a time at a low rate of demand (say, up to ten per year). It is assumed that their is a long period of time during which the average demand does not vary substantially. Units of stock are ordered one at a time as demanded and are carried in a system consisting of depots which may accept demands for stock. The mathematical models provide a basis for determining (1) the optimum amount of stock for the system to carry, (2) the optimum number of carrying points for stock, (3) the best mode of transportation from the supplier to the carrying points, and (4) efficient rules for selecting the carrying point to receive an allocation from the suppliers and for determining redistributions between depots. (Author)

AD-415 827 Div. 18, 1, 15
(TISTB/CCH) OTS price $4.60

Rand Corp., Santa Monica, Calif.
A STATISTICAL DESCRIPTION OF DEMAND PATTERNS EVOLVING THROUGH TIME,
by George S. Fishman. Aug 63, 33p.
Contract AF49 638 700
Unclassified report

Descriptors: (*Air Force logistics command, Mathematical prediction), (*Maintenance, Flight testing), Test methods, Time.

After perusal of sample data, the observation often made about demand is that the variance is large compared to the mean. Periodicities of the sort uncovered here explain this phenomenon. For example, a demand process may be at the peak of a cycle one day and at the trough on another. Personnel at Beale argue that schedules for take-offs and landings determine when an aircraft is available for maintenance, and therefore determine the pattern of removals and replacements. The author is of the opinion that institutional maintenance procedures are indeed responsible for many of the uncovered characteristics of demand. The primary contribution of this paper to demand prediction has been to show the diverse behavior of demand patterns that may actually exist. Wherever attempts at explaining these patterns have been made, it has been done on a purely conjectural basis and, hence, they are really ''food for thought'' rather than ''gospel truths.'' Future researchers in demand prediction should take account of these apparent diversities in demand. Hopefully they will find appropriate characterizations of the demand patterns then under scrutiny from pilot spectral analyses such as this one. (Author)

AD-415 865 Div. 18
(TISTB/AAR) OTS price $2.60

Institute for Defense Analyses, Washington, D. C.
A LANCHESTER MODEL OF GUERRILLA WARFARE,
by S. J. Deitchman. Oct 62, 20p. Technical note 62 58; IDA HQ62 678
Contract SD50
Unclassified report

Descriptors: (*Guerrilla warfare, Models (Simulations)), Warfare, Armed forces (Foreign), Countermeasures, Weapons, Military tactics.

A variation of the Lanchester equations is applied to exploration of the force ratios required to win in guerrilla-counter-guerrilla warfare. It is shown that an attacking guerrilla force can, by using tactics which compensate for its weaknesses, defeat a force of defending regulars

which has overall superiority in numbers and weapons. The defenders can win by appropriate selection of weapons, countertactics, and group sizes for individual engagements. In general, however, the high overall ratios of defending regulars to attacking guerrillas which have characterized recent warfare of this kind in which the defense has been successful are extremely difficult to reduce. (Author)

AD-416 358 Div. 18, 32
(TISTB/CCH) OTS price $11.00

Boston U. School of Public Relations and Communications, Mass.
THE RIGHT TO KNOW VS. THE NEED TO KNOW,
by Sheldon I. Godkin. 1963, 137p.
Unclassified report

Master's thesis.

Descriptors: (*National defense, Public relations), (*Public relations, National defense), Social communications, Newspapers, Foreign policy.

The area to be analyzed in this thesis is one of the most important, pervading, and current themes of today. The problems of censorship in a free society, particularly in light of the nature of the insidious Communist threat, require a delicate and continual balancing of the necessity for our government to withhold certain information which would, if released, be detrimental to our national interests and/or defense, and the right of the public to know those facts that are essential to government by the informed consent of the people. As is true of many of the most important questions of our time, there is no formula, no pat answer, and no ''standard operating procedure'' for this matter, but there is the necessity for striking a balance in the field of government information practices. (Author)

19. NAVIGATION

AD-415 658 Div. 19
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATING THE INERTIA OF A RUDDER IN CERTAIN GUIDANCE PROBLEMS,
by O. V. Grigoryeva and A. S. Kelzon. 19 Apr 63, 10p.
FTD TT62 1683 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy - Aviatsionnaya Tekhnika, no. 4, pp. 22-29, 1961.

Descriptors: (*Guidance, Theory), Acceleration, Velocity, Rotation, Inequalities, Differential equations, Tables, Stability, Moments.

AD-415 931 Div. 19
(TISTP/RD) OTS price $3.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
STUDY AND ANALYSIS OF SELECTED LONG-DISTANCE NAVIGATION TECHNIQUES. VOLUME I: SUMMARY,
Final rept., 21 Sep 61-31 July 62,
by James O'Day, Irvin Sattinger, Robert Scott and Joseph Sullivan. Dec 62, 31p. Rept. no. 4761 10 F, Vol. 1
Contract ARDS436, Task 116 8R
Unclassified report

Descriptors: (*Navigation, Commercial planes), Very low frequency, Inertial navigation, Costs, Aircraft, Doppler navigation, Radar navigation, Gyroscopes, Satellites (Artificial), Navigation satellites.

The state of the art and the development potential of heading references, VLF (very-low-frequency) radio systems, inertial techniques, and and satellite systems have been considered for their applicability to long-range ocean-crossing nonmilitary aircraft from 1965 to 1975. The navigation systems discussed here are by no means the only competitors for position and course determination over transoceanic and high-altitude transcontinental regions; our data and information should permit further comparison with other systems. We conclude that magnetically staved and good free gyroscopes will continue to be the principal heading references for commercial aircraft; we recommend improvement programs in magnetic compasses and the use of nonfloated friction-averaging gyros. We do not expect that VLF systems will have been sufficiently operated to be acceptable for commercial aviation before 1975. However, their ability to cover large areas and inherent accuracy make them attractive if certain propagation and instrumentation problems can be solved. In their present form inertial systems are competitive with doppler navigation systems, at least in accuracy. (Author)

AD-415 957 Div. 19, 12
(TISTA/VGW) OTS price $5.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
RESEARCH ON ''OPTIMIZATION THEORY'' AND AEROSPACE APPLICATIONS.
Aug 63, 33p. TS2
Contract AF49 638 1207, Proj. 7856 06
AFOSR 5233 Unclassified report

Descriptors: (*Controllable thrust rocket motors, Trajectories), (*Space flight, Optimization), Flight paths, Rocket trajectories, Mathematical analysis, Calculus of variations, Differential equations, Functional analysis.

The mathematical studies presented include Research in Successive Approximation Techniques, The Relation of Transversal Surface Theory to Necessary Conditions, Study of Singular Extremals, Trefftz-Friedrichs Duality Principle, as well as Optimal Multistage Rocket Flight and Other Discontinuous Variational Problems. (Author)

AD-416 263 Div. 19, 30
(TISTM/TCG) OTS price $4.60

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
INERTIAL GUIDANCE EQUIPMENT TESTING ON THE MIT PRECISION CENTRIFUGE WITH SOME COMPARISONS TO SLED TESTING,
by John M. Buchanan. June 63, 43p. Rept. no. E1223
Contract AF29 600 2068, Proj. 52 167; 52 202
Unclassified report

This report was presented at the Inertial Guidance Test Symposium sponsored by the Air Force Missile Development Center, 16-17 October 1962, Hohloman AFB, New Mexico.

Descriptors: (*Inertial guidance, Instrumentation), (*Centrifuges, Tests), (*Rocket propelled sleds, Inertial guidance), Gyro compasses, Acceleration, Accelerometers, Errors, Test methods, Test equipment.

A description is given of the principle centrifuge tests for high acceleration performance of the gyro, accelerometer and IMU. The deviations in observed performance due to random uncertainties in the MIT 35 foot-radius machine parameters are calculated and compared with typical test data. A report on operation and use of this facility is followed by a comparison of the centrifuge and rocket-propelled sled tests for determining inertial guidance equipment errors proportional to ''g2''. Emphasis is given to the facts that the short ''g2'' time history basically limits the accuracy of determining these errors on the sled-borne platform (as in the airborne rocket flight), and that this limitation does not exist in centrifuge testing. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-415 657 Div. 20, 15
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CYBERNETIC WAYS OF IMPROVING MEASURING EQUIPMENT,
by S. M. Mandel'shtam. 10 Apr 63, 4p.
FTD TT63 115 Unclassified report

Trans. from Priborostroyeniye, no. 10, pp. 30-31, 1962.

Descriptors: (*Cybernetics, Communications theory), (*Instrumentation, Measurement), Errors, Symposia, Bionics, Measuring device (Electrical and electronics).

AD-415 688 Div. 20
(TISTM/AMS) OTS price $1.50

California U., Los Angeles School of Medicine.
CHARACTERISTICS OF FALLOUT FROM A DEEPLY BURIED NUCLEAR DETONATION FROM ABOUT 3 TO 150 MILES FROM GROUND ZERO, PART II. AERIAL RADIOMETRIC SURVEY.
Aug 62, 64p.
Unclassified report

Report on Project Sedan.

Descriptors: (*Radioactive fallout, Underground explosions), (*Underground explosions, Radioactive fallout), (*Nuclear explosions, Radioactive fallout), Fission, Particle size, Radioactive decay, Zirconium, Strontium, Idine, Tellurium, Tungsten, Barium, Lanthanum, Isotopes, Gamma rays, Distribution, Radiogical dosage.

The objectives of CETO Project 62.86 were to determine the physicnl and radiological characteristics of fallout from the detonation of a nuclear device buried in desert alluvium at 635 feet below ground surface. The primary objective of CETO Project 62.86, Aerial Radiometric Surveys, to determine the areal distribution of Sedan fallout deposited on the ground from 10 to 200 miles from ground zero, was accomplished. (Author)

AD-415 708 Div. 20
(TISTM/TLG) OTS price $11.00

Naval Ordnance Lab., White Oak, Md.
ENERGY PARTITION OF WATER-CASED EXPLOSIONS IN AN IDEALIZED MODEL REACTOR VESSEL,
by James F. Proctor. Apr 63, 1v.
NOL TR62 155 Unclassified report

Descriptors: (*Reactor safety systems, Model tests), (*Nuclear reactors, Containment), (*Reactor accidents, Simulation), Explosions, Shock waves, Absorption.

Investigations were made of the partition of mechanical and non-mechanical energies resulting from the detonation of a water-cased explosive surrounded by air in a closed piston-fitted vessel. Of eight postulated governing parameters, the three more important parameters are given, i. e., charge weight, mass-per-frontal area, and water-to-air ratio, on energy partition. Analytic equations were established that express energy partition in terms of model-plug response to simulated excursion-type loading. These equations require for their solutions only a knowledge of the displacement-time history of the model plug. Eleven energy-partition experiments were conducted in a test apparatus that simulates the Enrico Fermi Atomic Power Plant. Experimental displacement-time data were graphically and analytically treated to obtain various plug-response functions and the subject energy partition. For the subject experiments only, it is concluded that increasing water-to-air ratios have a marked decreasing effect on energy partition (ratio of mechanical to non-mechanical energy), that increasing mass-per-frontal-area ratios have only a slight decreasing effect on energy partition, and that increasing charge weights have a slight increasing effect on energy partition. (Author)

AD-415 781 Div. 20
(TISTP/JP) OTS price $1.10

Litton Systems, Inc., Woodland Hills, Calif.
(No title).
Progress rept.
Aug 63, 6p.
Contract AF33 657 10584
Unclassified report

Descriptors: (*Gyroscopes, Radiation effects), (*Preamplifiers, Radiation effects), Transistors, Transistor amplifiers.

AD-415 889 Div. 20
(TISTM/ODN) OTS price $1.10

New York U., N. Y.
(No title).
Final rept.,
by Serge A. Korff. 1 Nov 59, 4p.
Contract AF18 600 1555
AFOSR TR59 176 Unclassified report

Descriptors: (*Neutron counters, Impurities), (*Boron compounds, Fluorides), Geiger counters, Neutrons, Purification, Bibliographies.

AD-416 155 Div. 20, 32
(TISTM/AMS) OTS price $3.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST COORDINATE INDEX PART II.
Accession lists for 1 July 62-31 Aug 63.
15 Sep 63, 63p.
Unclassified report

Descriptors: (*Radiation effects, Documentation), (*Documentation, Radiation effects), Indexes, Subject indexes, Abstracts, Bibliographies, Information retrieval, Electromagnetic waves, Dosimeters, Materials, Electrical properties, Electromagnetic properties, Magnetic properties, Chemical properties, Physical properties, Mechanical properties, Optical properties, Nuclear properties.

The following inverted concept-coordinate index is based upon terms generated in the REIC subject files. The index is cumulative throughout the year, and the staff plans to provide a dual dictionary at the end of each contract year to facilitate the retrospective search capabilities for the accession list abstracts. The index is subdivided into four sections. The first, Radiation Environment, includes dosimetry and energy aspects of all electromagnetic and particulate radiation sources, with the exception of space radiation. Section two deals with materials, properties, secondary environment (including space environments), devices, and all other subject concepts. Section three lists all authors, in alphabetical order; and section four lists the generating organization. (Author)

AD-416 274 Div. 20, 18, 4
(TISTP/TLG) OTS price $4.60

Engineering-Physics Co., Rockville, Md.
CHARACTERISTIC EMISSIONS FROM AN UNDERGROUND EXPLOSION.
Semi-annual rept. no. 2,
by Dean Reily and Vincent Cushing. 3 Dec 62, 65p.
Contract DA49 146XZ089, Proj. 109; ARPA Order 172 61
AEC NP12700 Unclassified report

Descriptors: (*Underground explosions, Wave transmission), (*Seismic waves, Analysis), Nuclear explosions, Earthquakes, Detection, Propagation, Mechanical waves, Explosion effects.

An investigation was made to determine the wave shapes of the seismic disturbances that are generated by an underground nuclear explosion. The investigation took into account (1) the generation of the mechanical disturbances, (2) the propagation of these disturbances. Two means of wave generation were considered: (a) generation of waves from the expanding cavity (body waves); (b) generation of waves due to surface spall and subsequent impact. The two types of wave propagation studied were: (a) waves in crushable material and (b) waves in elastic material. The elastic precursor, a wave shape detail of the direct or body wave disturbance, was simply treated so as to show the possible gains to be obtained from a more detailed study. (Author)

AD-416 292 Div. 20, 25
(TISTP/HG) OTS price $1.60

Sacramento Peak Observatory, Sunspot, N. Mex.
A STUDY OF HYDROGEN EXCITATION AND IONIZATION IN SOLAR PROMINENCES,
by Y. Shi-Huei and tr. by Alicee B. Dunn. 1961, 16p. Solar research note no. 41.
Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs. 25, pp. 234-248, 1961.

Descriptors: (*Hydrogen, Excitation), (*Ionization, Hydrogen), Solar spectrum, Solar corona, Recombination reactions, Monochromatic light, Atoms, Atomic energy levels, Stimultaneous equations, Equations, Tables, Electrons.

The mechanisms of hydrogen excitation and ionization are discussed on the basis of known results. Expressions for 7 atomic processes which determine the population of hydrogen atoms are discussed. These expressions contain a number of unknown quantities which are determined by solving the system of stability equations. This allows for the calculation of the numbers of all the atomic processes. A comparison of their values leads to the conclusions: (1) the hydrogen excitation in prominences is determined mainly by their proper radiation, (2) for the high levels hydrogen ionization is caused by electron collisions, for low levels photoionization plays a more important role. (Author)

AD-416 297 Div. 20, 25, 4
(TISTM/TCG) OTS price $3.60

University Coll. of North Wales (Gt. Brit.).
POSSIBILITIES FOR HIGH-RESOLUTION NUCLEAR MAGNETIC RESONANCE IN SOLIDS.
Final technical rept. 1 Dec 62-31 July 63,
by E. R. Andrew. 31 July 63, 34p.
Contract DA91 591EUC2783
Unclassified report

Descriptors: (*Solids, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Phosphorus compounds), (*Phosphorus compounds, Relaxation time), Chlorides, Phosphides, Phosphoric acids, Zinc compounds, Sulfides, Spin, Rotation, Electrons, Crystal lattices, Molecular rotation, Nuclear spins, Nuclear resonance, Nuclear moments, Quadrupole moments, Electron transition, Anisotropy, Chlorine compounds, Sulfur compounds.

The high-resolution nuclear magnetic resonance spectra observed in liquids have provided a powerful tool in structural analysis. Such spectra are not however normally observable with solid specimens because the fine features are overlaid by the magnetic dipolar interactions between the nuclei. We have shown that the dipolar broadening can be removed for solid specimens also by rapid rotation about an axis inclined at the angle 54 degrees 44 min to the applied field. The theory of the method is outlined, and the effect of rapid rotation on other sources of broadening is discussed: field inhomogeneity, quadrupolar broadening, chemical shift anisotropy, electron-coupled spin-spin interactions. Details are given of the experimental arrangement, and in particular of the air turbines used to obtain high rates of rotation in the magnet gap. The results are given of investigations of the P-31 spectra of phosphorus pentachloride, zinc phosphide, phosphorus sesquisulphide, tetraphosphorus pentasulphide, phosphorus pentasulphide and pyrophosphoric acid. A nuclear cross-relaxation effect, induced by specimen rotation, is reported for solid phosphorus pentachloride. (Author)

AD-416 313 Div. 20, 30
(TISTM/TCG) OTS price $13.00

Naval Postgraduate School, Monterey, Calif.
COMPUTER PROGRAMS FOR THE TWO BODY APPROXIMATION TO THE RADIATION DAMAGE PROBLEM,
by John P. Bird and Ronald L. Kronz. 1963, 178p.
Unclassified report

Master's thesis.

Descriptors: (*Radiation damage, Computer logic), (*Programming (Computers), Radiation damage), (*Mathematical models, Radiation damage), Computers, Potential theory, Kinetic theory, Energy, Atoms, Chemical reactions, Mass-energy relation, Atomic energy levels, Crystal lattices, Thermal stresses, Transition temperature.

A binary collision simulation of the radiation damage problem is proposed. Energy thresholds and parameter adjustment are discussed. Preliminary results show strong focusing in the (110) direction and weaker focusing in the (100) direction. Although not complete, the model is expected, with suggested modifications, to adequately represent the radiation damage problem. (Author)

AD-416 356 Div. 20
(TISTM/REB) OTS price $1.50

Ames Lab., Iowa State U. of Science and Tech.
DESIGN, CONSTRUCTION, AND PERFORMANCE OF TWO COMPACT AIR COOLED SODIUM HEAT EXCHANGERS,
by William F. Brown, Ray W. Fisher, and Henry M. Black. May 63, 59p. Rept. no. IS562
Contract W7405eng82
Unclassified report

Descriptors: (*Heat exchangers, Air cooled), Liquid metals, Design, Performance (Engineering), Sodium, Construction, Nuclear reactors, Pressure.

A bare tube crossflow heat exchanger and a finned tube crossflow heat exchanger were designed, constructed and tested. The exchangers have sodium as a tube side fluid and air as a shell side fluid and were constructed of inconel. The bare tube heat exchanger has 3 unmixed passes on the sodium side and 1 mixed pass on the air side. The finned tube heat exchanger has 1 unmixed pass on the sodium side and 1 mixed pass on the air side. Both exchangers were designed to have a 10 kw heat exchanger rate at 1500 F, 600 lb/h on the sodium side and at 80 F inlet temperature, 200 lb/h on the air side. The tests were run from 1 kw to 4 kw at sodium temperatures up to 830 F and sodium flow rates up to 2500 lb/h. The inlet air temperatures were about 80 F. The maximum air flow was 220 lb/h. The maximum pressure drop on the air side of the bare tube heat exchanger was found to be 0.15 in. of water. The pressure drop on the air side of the finned tube heat exchanger was negligible. The maximum predicted pressure drop in the sodium system was 10 psi in the bare tube heat exchanger and 1 psi in the finned tube heat exchanger. (Author)

AD-416 442 Div. 20
(TISTP/TL) OTS price $1.60

Johns Hopkins U., Baltimore, Md.
COUPLING THE HELIUM CHAMBER TO THE 800 MEV/C K-BEAM,
by Peter E. Schlein and T. E. Toohig. Mar 61, 17p.
Contract AF18 603 143
AFOSR Rept. no. 407 Unclassified report

Descriptors: (*Particle beams, Meson bombardment), (*Helium, Bubble chambers), (*Mesons, Particle trajectories), Shielding, Telescopes, Magnet coil, Vacuum apparatus, Brass, Particles, Magnetic fields, Scattering, Distribution, Electrons.

AD-416 493 Div. 20
(TISTB/AAR) OTS price $22.25

Curtiss-Wright Corp., Caldwell, N. J.
CIVIL DEFENSE MANUAL FOR RADIOLOGICAL DECONTAMINATION OF MUNICIPALITIES,
by C. Herbert Wheeler, Jr. and Mario V. Cammarano. Aug 63, 415p.
Contract OCD OS62 279, Task 3236A
Unclassified report

Descriptors: (*Radioactivity, Decontamination), (*Civil defense systems, Instruction manuals), Contamination, Radioactive fallout, Radiation hazards, Nuclear weapons.

This manual covers the Operational Recovery Phase of radiological defense, which is concerned with decontamination of structures and areas made dangerous or lethal by fallout. It assumes that no significant damage has been sustained in the area due to blast or fire. The purpose of the manual is to furnish information and planning techniques which will enable Civil Defense Planners to formulate and implement plans of action for Operational Recovery from nuclear attack in areas subject to radioactive fallout. The manual is written for Municipal Planners and Engineers, and for special groups, such as equipment operators and medical doctors, to whom individual chapters will be of particular value and interest. Detailed technical information on methods of decontamination is presented. The instructions cover the cleaning of building structures, pavement, and natural areas. One chapter deals with cold weather decontamination problems. The efficiencies of decontamination methods and equipment are evaluated in terms of human effort. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-415 652 Div. 22, 10
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ABOUT THE MAIN CAUSES OF THE DIFFERENCE BETWEEN INITIATING AND SECONDARY EXPLOSIVE SUBSTANCES,
by K. K. Andreyev. 9 May 63, 5p.
FTD TT63 325 Unclassified report

Trans. from Doklady Akademii Nauk SSSR, (Khimicheskaya Tekhnologiya), 146:2, pp. 413-414, 11 September 1962.

Descriptors: (*Explosive materials, Detonations), (*Combustion, Phase studies), Gases, Chemical reaction, Sensitivity, Detonation waves.

AD-415 926 Div. 22
(TISTP/RD) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DETONATION OF A CYLINDER OF HIGH EXPLOSIVE CONTAINING AN AXIAL CORE OF PYROTECHNIC COMPOSITION,
by J. Hershkowitz, E. Dalrymple and D. Dorfman. Aug 63, 14p. TR3098
Unclassified report

Descriptors: (*Explosive materials, Detonations), Aluminum, Combustion, Perchlorates, Potassium compounds, Pyrotechnics.

In order to determine whether an explosive based on the complete combustion of aluminum within the detonation zone would be superior to existing explosives, observations were made of the detonation behavior of a composite, consisting of an outer cylindrical shell of 9404 explosive (OD = 1.5 inches, ID = 0.5 inch) and an inner cylindrical core of 60/40 potassium perchlorate/aluminum (OD = 0.5 inch). The explosive shell was in the form of two cylinder-halves. The 60/40 insert consisted of pressed pellets, of density 2.35 g/cm3. These experimental results showed the following: jet effects in the residual space between the cylinder-halves; the 60/40 detonation always propagating at a rate set by side initiation and compression by the 9404; the aluminum combustion completed as an afterburning process, rather than forward of the Chapman-Jouguet plane. Computer calculations of the ideal detonation velocity of the 60/40 predicted speeds of 6685 m/s and 7442 m/s for densities of 2.25 and 2.50 respectively. It was concluded that the 60/40 composition can not be made to provide an explosive superior to 9404. (Author)

AD-416 035 Div. 22, 25
(TISTP/RD) OTS price $7.60

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
PHOTOGRAPHIC MEASUREMENTS ON BANSHEE,
by Donald F. Hansen and James C. McCue. 16 Aug 63, 59p. Rept. no. B2596
Contract DA49 146xz092
Unclassified report

Descriptors: (*Explosions, High altitude), (*Explosions, Photographic analysis), Hydrodynamics, Tracking telescopes, Balloons, Guided missiles (Surface-to-air), Pentolite, Detonations, Recording systems, Data processing systems.

BANSHEE, an acronym for Balloon and Nike Scaled High Explosives Experiments, was a series of high altitude explosions using center-point-detonated 500-lb spherical pentolite charges. The program was intended to measure the hydrodynamic behavior of chemical explosions at various altitudes, and in turn provide information for deducing or checking the scaling laws appropriate to the altitude range of 0 to 100,000 ft. Technical photography was used to determine the behavior of the fireball radius as a function of time. Both high speed framing cameras and a slitless streak camera were used to cover the BANSHEE events which took place during 1961. The fireball radius vs time data were obtained primarily from the streak camera records, for time periods up to 60 milliseconds in some instances. A comparison of radius vs time information shows an obvious increase of radius as a function of altitude. The radius vs time data for representative events at sea level, 25,070 feet and 79,040 feet, when plotted in terms of Brodes' reduced variable, indicates that the fireball radius vs time can be scaled with altitude for a considerable portion of its early time history. (Author)

AD-416 267 Div. 22
(TISTP/AW) OTS price $2.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
PREPRODUCTION TESTING OF THE W. H. OLSEN BDU-8/B PRACTICE BOMB,
by Lee W. Short. July 63, 17p.
Proj. ESP921X0000 021500B
AFSWC TDR63 63 Unclassified report

Descriptors: (*Bombs, Training ammunition), Parachutes, Explosives initiators, Vibration, Loading (Mechanics), Concrete, Bomb fins, Shock (Mechanics).

Testing of the W. H. Olsen BDU-8/B practice bomb was performed by AFSWC at the request of the Royal Canadian Air Force. The purpose of these tests was to establish the W. H. Olsen Manufacturing Company, Ltd., as a qualified producer of BDU-8/B practice bombs. Testing was performed using two sample bombs produced by this company, numbered WHO-2 and WHO-3. To expedite testing, each of the bombs was subjected to a portion of the specified test requirements. Testing was performed in general accordance with MIL-B-25846A and MIL-B-27000, and included functional testing of the parachute deployment system initiator assembly, static load testing, shock testing, and vibration testing. The results of the test were satisfactory. (Author)

AD-416 302 Div. 22
(TISTP/AW) OTS price $1.10

Remington Arms Co., Inc., Bridgeport, Conn.
DEVELOPMENT OF EXPLOSIVES AND INITIATORS FOR SPECIAL OPERATIONS.
Monthly progress rept.,
by Theodore B. Johnson. June 63, 2p. Rept. no. 3
Contract DA19 020AMC0115A
Unclassified report

Descriptors: (*Detonating cord, Nitrogen compounds), (*Explosive materials, Freezing point depressants), Armed forces operations, Ammonium compounds, Nitrates, Explosives initiators, Ammonium picrate.

Initiator work has centered around efforts to make a satisfactory improvised fuse. Because of the good results obtained with the picric acid-litharge initiator it seemed desirable to make a

fuse from the same materials if possible. Work on improvised high explosives was limited to attempts to determine optimum conditions for preparing dinitro Zerex, the nitrated ethylene glycol antifreeze from ammonium nitrate, battery and commercial antifreeze. (Author)

AD-416 303 Div. 22
(TISTW/RHR) OTS price $1.10

Remington Arms Co., Inc., Bridgeport, Conn.
DEVELOPMENT OF EXPLOSIVES AND INITIATORS FOR SPECIAL OPERATIONS.
Monthly progress rept., 1-20 July 63,
by Theodore B. Johnson. 20 July 63, 1p. Rept. no. 4
Contract DA19 020AMC0115A
Unclassified report

Descriptors: (*Fuzes (Ordnance), Production), (*Detonators, Fuzes (Ordnance)), Tests, Acids, Impregnation, Fragmentation, Silver compounds, Nitrates, Cartridge cases, Sensitivity, Humidity, Moisture, Malfunctions, Explosive materials.

AD-416 316 Div. 22
(TISTP/WH) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
TWO EXPLOSIVES GENERATING CONDENSIBLE PRODUCTS,
by M. F. Murphy. Sep 63, 38p.
NOL TR63 12 Unclassified report

Descriptors: (*Explosives materials, Detonation), (*Detonation waves, Propagation), (*Metalorganic compounds, Organic compounds), Velocity, Hydrogen peroxide, Aluminum, Lithium compounds, Perchlorates.

Permanent reaction products and some explosive properties of two compositions were studied to establish detonability and the post detonation equilibrium products. The compositions were based on aluminum-aq hydrogen peroxide (98%) and aluminum-lithium perchlorate trihydrate. Stable detonation rates were measured for well confined compositions of both types balanced to alumina and steam. The concentration of hydrogen in the reaction products of a series of aluminum-hydrogen peroxide charges with oxygen balances rising toward zero decreased and became negligible. Experimental results from these charges were compared with Ruby Code calculations of reaction products for a charge balanced to alumina and steam and also with data from experiments with water immersed torpexes. The reaction products from a single charge of aluminum-lithium perchlorate were discussed. The detonation rate of aqueous hydrogen peroxide (97.5%) was measured and compared with values found in prior German work and with a Ruby Code calculation. The gap sensitivity of aqueous hydrogen peroxide (97.5%) was measured. (Author)

AD-416 475 Div. 22
(TISTP/JP) OTS price $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
BODY MOTIONS OF A BURIED ARCH SUBJECTED TO BLAST LOADING,
by J. R. Allgood and D. DaDeppo. 16 Aug 63, 50p.
Technical note N486
Proj. Y F008 10 108
DASA 13 018 Unclassified report

Descriptors: (*Underground structures, Shock waves), Curved profiles, Nuclear explosion damage, Blast, Stresses, Soils, Deformation.

An approximate method is developed for predicting the deflections of the footings of a buried arch subjected to a blast wave traveling along the surface. Results from the theory are compared with measured values from Operation Plumbbob Structure 3.3a. The influence of the dominant parameters is discussed. It is shown that duration of loading is exceedingly important in governing the magnitude of footing deflections. The theory is presented in a form suitable for use in the design office. (Author)

23. PERSONNEL AND TRAINING

AD-415 703 Div. 23, 30
(TISTM/TCG) OTS price $1.60

Educational Research Corp., Cambridge, Mass.
THE DEVELOPMENT OF A PROFICIENCY TEST FOR SAGE MANUAL DATA INPUTS PERSONNEL.
Final rept.,
by W. Douglas Brooks. June 61, 11p.
Contract AF19 604 5195, Proj. 1975, Task 76892
ESD TR61 25 1 Unclassified report

Report on ERC Project 53.

Descriptors: (*Personnel, Data processing systems), (*Operators (Personnel), Tests), (*Performance tests, Personnel), Input-output devices, Handbooks, Data, Test methods, Punched cards, Digital systems, Display systems, Air control centers, Air Defense Command, Antiaircraft defense systems.

An earlier part of this project was to develop a prototype job-oriented performance test for the SAGE positions of Manual Data Input Supervisor and Technician. The primary goals of the present project were to up-date the test and modify it so that (a) it could be administered and scored by Air Force personnel and (b) further forms of the test applicable to other SAGE Direction Centers could be constructed by in-service personnel. Since SAGE Direction Centers differ in their levels of operational readiness, it was found necessary to construct two different forms of the test: one based on Program Model 3 and the other on Program Model 5. The test based on Model 3 procedures was administered to Boston Air Defense Sector personnel, while the test using Model 5 procedures was administered to the personnel at the Syracuse Air Defense Sector. The techniques employed in the construction and modification of the tests seem to be useful for the development of similar tests for local needs or for later programmed models. (Author)

AD-416 414 Div. 23, 12
(TISTP/HSS) OTS price $9.60

Sylvania Electric Products, Inc., Waltham, Mass.
TRAINING EQUIPMENT PLANNING INFORMATION (TEPI).
Incremental rept. no. 2,
by W. R. Greninvull. 1 Aug 63, 1v. Rept. no.
MPO PD13 200
Contract AF04 694 261
Unclassified report

Report on Ground Electronics System for WS-133B (Minuteman).

Descriptors: (*Training devices, Guided missile personnel), Military training, Guided missiles (Surface to surface), Strategic weapons, Training, Radar trainers.

The purpose of the Training Equipment Planning Information (TEPI) 2nd increment report is to provide the Air Force with a technically sound basis for early determination of training equipment requirements for which development schedules and action must be initiated in order to insure the availability of trained operator and maintenance personnel concurrent with the delivery of operational equipment. The TEPI report describes and presents the pertinent data for each item of training equipment recommended to support the individual, and crew (or unit) training of operator and maintenance personnel for the WS-133B Ground Electronics System. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-416 443 Div. 24, 20
(TISTM/REB) OTS price $4.60

Washington U., St. Louis, Mo.
A STUDY OF UNIFORM ISOTHERMAL PROCESSING OF NUCLEAR EMULSIONS,
by Donald Avery Kniffen. Sep 60, 39p.
Contract AF49 638 833
AFOSR TN60 1391 Unclassified report

Thesis presented to Graduate Board of Washington University in partial fulfillment for the degree of Master of Arts.

Descriptors: (*Photographic emulsions, Processing), (*Nuclear particles, Photographic emulsions), Controlled atmospheres, Potassium compounds, Bromides, Photographic chemicals, Additives.

On the basis of the results presented here it is safe to conclude that the optimum development procedure among those considered in this experiment is an isothermal one using a developer which contains potassium bromide in the amount of about .8 grams per liter in addition to an amidol developer. (Author)

25. PHYSICS

AD-415 615 Div. 25
(TISTP/JP) OTS price $5.60

Minnesota U., Minneapolis.
THE MOBILITY AND RECOMBINATION OF POSITIVE RARE GAS IONS,
by V. R. Mittelstadt, J. M. Madison and R. J. Oskam. Jan 63, 49p.
Grant AF AFOSR62 103
AFOSR 4839 Unclassified report

Descriptors: (*Helium group gases, Recombination reactions), Transport properties, Diffusion, Ionization, Ions, Neon, Argon.

This final report describes briefly (a) a microwave system for measuring the electron density in decaying plasmas over t density range of about five thousand, (b) an experimental tube for measuring the value of the mobility of positive ions by means of the transit-time method, and (c) the results obtained during the period of the contract. The studies were confined to the rare gas ions and excellent agreement was found between the value of the mobility of atomic and molecular ions as determined from ambipolar diffusion coefficient measurements and those found by means of the ion transit-time method. The influence of the presence of negative ions on the ambipolar diffusion coefficient of electrons was demonstrated. The recombination coefficients of molecular neon and molecular argon ions were found to be independent of pressure and the values were in excellent agreement with previous studies. (Author)

AD-415 617 Div. 25
(TISTP/JP) OTS price $8.60

Pennsylvania State U., University Park.
SPHERICAL SHOCK WAVES IN SOLIDS,
by Harry H. Calvit and Norman Davids. 9 July 63, 84p. Technical rept. 2
Contract DA36 034ORD3576
Unclassified report

Descriptors: (*Shock waves, Solids), (*Solids, Wave transmission), Metals, Explosions, Detonation waves, Impact shock, Hypervelocity projectiles, Cratering, Equations of state, Blast, Aluminum, Differential equations, Spheres, Shock (Mechanics).

Contents: Introduction--Reasons for Studying Spherical Shock Waves, Physics of Cavity Expansion due to Explosive Impace, General Nature of Shock Waves, and Statement of Problem and Scope of Thesis; Brief Review of Past Work--Elastfc-Plastic Effects, Similarity Solutions of Equations of Gas Dynamics, Self-Similar Solutions of the Problem of Cratering Due to Hypervelocity Impact, and Numerical Integration of the Differential Equation of Spherical Blast Waves in a Gas and Hydrodynamics of Hypervelocity Impact; Self-Similar Solution for Problems with Spherical Symmetry--Theory, and Solution of the Governing Differential Equation of Self-Similar Motion; Application of the Theory of Self-Similar Motion to the Problem of Expansion of a Spherical Cavity in a Metal Due to Explosive Impact--Description of Model and Assumptions, Equations of State of Metals, Solution of the Blast Wave Problem in Aluminum, Blast Waves in Other Metals; and Consideration of the Non-Similar Aspects of the Blast Wave Problem; Experimental Procedure and Results; Singular Point of Ordinary Differential Equations; Numerical Program--Fortran Program.

AD-415 622 Div. 25
(TISTP/JP) OTS price $3.60

Electro-Optical Systems Inc., Pasadena, Calif.
PLASMA DIAGNOSTICS STUDIES FOR CROSSED FIELD ACCELERATORS,
by Andrew Proudian. Mar 63, 30p. RN11
Contract AF49 638 1063
Unclassified report

Descriptors: (*Plasma medium, Test methods), Electron density, Temperature, Particle accelerators, Test equipment, Interferometers, Spectrum analyzers, Spectroscopy, Wave transmission, Microwaves, Particle beams, Line spectrum, Scattering, Magnetic fields.

Diagnostic methods investigated include: Spectroscopic and Inteferometric Methods -- Optical Inteferometry, Continum Intensity, Line Shape (Series Limit), and Relative and Absolute Line Intensity Measurements; Measurements Involving the Use of Particle Beams -- Electron scattering, Charge Exchange, and Excitation of Target Gas. (Author)

AD-415 632 Div. 25
(TISTM/TCG) OTS price $1.10

Washington U., Seattle.
(No title)
1 June 63, 2p. Technical status rept. no. 11
Contract Nonr47732
Unclassified report

Descriptors: (*Ultraviolet radiation, Luminescence), (*Gases, Proton cross sections), (*Nitrogen, Luminescence), Proton scattering, Spectra (Visible and ultraviolet), Excitation, Theory, Thermionic emission, Energy, Transformations.

AD-415 634 Div. 25
(TISTP/JP) OTS price $2.60

Benson, Robert W. and Associates, Inc., Nashville, Tenn.
MECHANICAL HYSTERESIS,
by Robert W. Benson. Apr 63, 25p.
Contract Nonr3995 00
Unclassified report

Descriptors: (*Crystal lattices, Fatigue (Mechanics)), (*Fatigue (Mechanics), Hysteresis), Electron transitions, Shear stresses, Elasticity, Potential theory, Crystals, Aluminum, Ultrasonic radiation, Deformation, Ultrasonic properties, Vibration, Stresses, Electrons.

Mechanical hysteresis loops have been obtained from a plot of the dynamic stress-strain characteristics of a material. The loops depict an assymmetric figure 8 pattern, for which the assymmetry is accounted for by the non-uniform elastic state of the material. Supplementary experiments demonstrating the complex motion of particles in a longitudinally excited vibrator, lead to the conclusion that the paths traced by electrons in the lattice structure is different for the tensile and compressive portions of the cycle. Since the potential field in the lattice structure is non-uniform, a hysteresis loss is observed. The lateral motion of a longitudinally excited vibrator is shown to produce shearing strains, which are a dominant factor in internal friction. Illustrations of the effect of the shape of the hysteresis loop on fatigue are given. (Author)

AD-415 639 Div. 25, 17
(TISTM/AMS) OTS price $4.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
A STUDY OF THE BEHAVIOR OF DISLOCATIONS AND THEIR INTERACTION WITH OTHER LATTICE DEFECTS UNDER CONDITIONS OF ALTERNATING STRESS,
by K. U. Snowden and H. H. F. Wilsdorf. July 63, 41p.
Contract AF33 616 6996, Proj. 7024, Task 7024 02
ARL 63 114 Unclassified report

Descriptors: (*Crystal lattice defects, Stresses), Aluminum, Copper, Electron microscopy, Friction, Shear stresses, Single crystals, Experimental data, Deformation.

In order to study the cyclic work hardening of Al and Cu single crystals two methods were used: (1) the accurate recording of stress-strain loops during cyclic straining, and (2) the direct observation of dislocation arrangements within crystals using transmission electron microscopy. The cyclic hardening experiments covered from one to 1000 cycles of reversed plastic strain amplitude and were made in push/pull with special attention being given to achieving axial stresses. (Author)

AD-415 645 Div. 25, 9
(TISTP/JP) OTS price $1.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RELAXATION PHENOMENA AT A HIGH SPEED GAS FLOW,
by M. A. Yel'yashevich and S. I. Anisimov.
15 Apr 63, 5p.
FTD TT62 1670 Unclassified report

Trans. from Doklady Akademii Nauk BSSR, 5:8, pp. 324-326, 1961.

Descriptors: (*Gas flow, Relaxation time), Entropy, Enthatpy, Oscillation, Scattering, Molecules, Temperature, Specific heat, Frozen equilibrium flow.

When solving the problem of gas dynamics it is frequently assumed that outer effects on the flow change the state of the gas quite slowly, so that in each point sets in an equilibrium between various degrees of freedom of gas molecules. In fact the process of setting in an equilibrium requires a finite time, and it can be expected, that at sufficiently rapidly changing outer influences against the flow no equilibrium will be reached. The problem in this case becomes quite complicated because in the system of gas dynamics equations are added kinetic equations, describing the change in state of inert degrees of freedom of gas molecules. A simple approximate calculation method is offered to calculate the nonequilibrium of the flow, based on the fact, that in all instances of practical interest the flow appears to be locally close either to equilibrium, or to the frozen, wherby the zones of almost equilibrium and almost frozen flow are separated by a sufficiently lucid boundary. (Author)

AD-415 656 Div. 25
(TISTP/JP) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE PROBLEM OF DISRUPTIVE DISCHARGE OF DIELECTRICS,
by I. G. Nekrashevich and I. A. Bakuto.
2 Apr 63, 9p.
FTD TT63 5 Unclassified report

Trans. from Doklady Akademii Nauk, BSSR, 6:1, pp. 26-30, 1962.

Descriptors: (*Dielectrics, Electric discharges), Energy conversion, Phase studies.

The development of every sort of physical process in matter is in the last analysis always determined by a change in energy density. Thus an uninterrupted increase in the energy reserve in a definite quantity of a solid phase gives rise to new structural transformations after a certain critical value has been attained, and also alters the aggregate state. These changes are usually related to some form or another of phase transformations. Any such transformations result either from the immediate action of heat without, increasing the thermal energy of motion in each volumetric unit, or from the initial accumulation in a given volumetric unit of a reserve of potential energy under the effect of external forces. When a certain critical value of energy density has been reached in some volumetric unit there begins the transformation of potential energy into other forms accompanied by the appearance of a new phase and also by the ineluctable transformation of a portion of the potential energy into energy of disordered thermal motion. In the case of disruptive discharge of a dielectric the role of this new phase will be played by the positive and negative carriers of the charge resulting from the particles' attaining the critical energy value necessary for a particle to pass over from the initial state into that of ionization. (Author)

AD-415 659 Div. 25, 26, 1
(TISTE/OHD) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE INSTITUTES OF HIGHER LEARNING (SELECTED ARTICLES).
10 Apr 63, 27p.
FTD TT63 203 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya ''Aviatsionnaya Tekhnika'', no. 3, pp. 79-86, 177-186, 1962.

Descriptors: (*Cylindrical bodies, Stresses), (*Structural shells, Mathematical analysis), Sandwich panels, Pressure, Deformation, Reliability, Aircraft.

AD-415 660 Div. 25
(TISTP/MFA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE EVALUATION OF THE INFLUENCE OF THE REABSORPTION EFFECT ON THE INTENSITY OF SPECTRAL LINES,
by N. G. Preobrazhenskiy. 23 Apr 63, 17p.
FTD TT63 257 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, no. 6, pp. 57-65, 1961.

Descriptors: (*Spectroscopy, Emissivity), (*Line spectrum, Intensity), Absorption, Measurement, Excitation, Plasma medium, Probability, Scattering, Discharge tubes, Atomic energy levels, Zinc, Barium.

New relationships were obtained which enable one to establish limit concentrations of atoms in plasma, below which distortions introduced into the integral intensity of a spectral line, as a result of its reabsorption, are known not to exceed 2%. Conditions are systemized for lowering the influence of the reabsorption effect, and a discussion is given of the results of some work done for revealing the mechanism of the excitation of the atoms taking into consideration the earlier unwarrantedly ignored secondary processes. (Author)

AD-415 689 Div. 25, 15
(TISTP/HG) OTS price $2.60

Polytechnic Inst. of Brooklyn, N. Y.
APPROXIMATE HEAT CONDUCTION SOLUTIONS FOR NON-PLANAR GEOMETRIES,
by Thomas J. Lardner. July 63, 21p. PIBAL rept. no. 665
Grant AF AFOSR419 63, Task 9782 01
Unclassified report

Descriptors: (*Thermal conductivity, Theory), (*Partial differential equations, Heat), Surface temperatures, Integration, Numerical analysis.

The temperature distribution in the region exterior to a spherical cavity whose surface temperature is constant is determined using Biot's variational principle for heat conduction and Goodman's heat balance integral technique. The procedure for applying the variational principle to problems of non-planar geometries is discussed. The heat flux at the surface of the cavity is evaluated by the two methods and compared with the exact solution. The applicability of the two above mentioned approximate techniques to heat conduction problems with non-planar geometries is demonstrated. (Author)

AD-415 699 Div. 25
(TISTP/MH) OTS price $8.60

Cornell U., Ithaca, N. Y.
EXCITED STATES OF THE NUCLEON,
by P. Carruthers. July 63, 70p.
Contract Nonr40138
Unclassified report

Descriptors: (*Nucleons, Excitation), Pions, Resonance, Scattering, Quantum, Mechanics, Trajectories, Dynamics, Elementary particles.

The quantum numbers of the higher resonances in pion-nucleon scattering belonging to the nucleon and 3-3 isobar trajectories are shown to arise from the exchange of the nucleon and pion-nucleon resonances themselves. In particular the members of the nucleon trajectory are created principally by forces due to the exchange of members of the 3-3 isobar trajectory and vice-versa. The quantum numbers obtained from dynamical considerations agree completly with these conjectured on the basis of Regge pole considerations. The dynamical scheme is approximately symmetrical under interchange of the two trajectories. (Author)

AD-415 713 Div. 25, 13, 26
(TISTP/MH) OTS price $8.10

American Scientific Corp., Alexandria, Va.
WATER GAIN BEHAVIOR OF OUTDOOR CLOSED STRUCTURES,
by Gordon S. Mustin. 1 Feb 63, 77p.
Contract NOrd16687, Proj. 400 49 3, Task 49 3
NAVWEPS Rept. 8374 Unclassified report

Descriptors: (*Containers, Check valves), (*Pressure regulators, Containers), (*Storage, Effectiveness), Water vapor, Water, Monte Carlo method, Check valves, Desicants, Containers, Temperature, Pressure, Statistical analysis.

A model of the water gain of empty structures stored in the open is derived. Using this model and a modified Monte Carlo procedure, a statistical analysis is made of probable water gains at 12 stations by enclosures which are free breathing and which have check valves set at +2 -1, +1 -1, +1 -1/2 and +1/2 -1/2 psig. It is concluded that a breather charge of one ounce per cubic foot should give about six months storage life anywhere in the world, assuming adequate container drawdown. Even the +1/2 -1/2 psig valve required no additional desiccant although it might be expected to breathe as much as 38 times per year at Los Vegas, Nevada with 2 sigma confidence. The least pressure-vacuum spread which will not adversely affect a reasonable storage life was not discovered. (Author)

AD-415 714 Div. 25, 15
(TISTP/HG) OTS price $2.60

Cornell U., Ithaca, N. Y.
RATIO LIMIT THEOREMS FOR CASCADE PROCESSES,
by P. E. Ney. May 63, 27p.
Contract Nonr40143
Unclassified report

Descriptors: (*Elementary particles, Energy), (*Mathematical models, Nuclear reactions), Probability, Statistical functions, Mathematical models, Integral equations, Time, Differential equations, Partial differential equations, Integration, Inequalities.

The evolution of a family of particles is studied; each of these particles is characterized by a real valued quantity which is called its energy. It is assumed that the process originates at ''time'' t = 0 with a single ''parent'' particle of energy X sub zero, which after a time T splits into N other particles of energies X sub 1 to X sub N respectively. Each of these ''offspring'' particles then behaves as a parent; its behavior depending only on its energy, and being independent of any other existing particles or of the history of the process. (Author)

AD-415 715 Div. 25
(TISTP/HG) OTS price $1.60

Institute for Molecular Physics, U. of Maryland, College Park.
NOTE ON THE RECALCULATION OF THE POTENTIAL CURVES FOR THE GROUND STATES OF I2 and H2,
by Stanley Weissman, Joseph T. Vanderslice and Ruben Battino. 18 June 63, 11p. Technical rept. no. 8
Contract Nonr59514, Task 051 425
Unclassified report

Descriptors: (*Quantum mechanics, Curve fitting), (*Diatomic molecules, Molecular spectroscopy), Hydrogen, Iodine, Molecular rotation, Molecular weight, Energy, Atomic properties, Integral equations, Partial differential equations, Integrals, Least squares method, Functions, Kinetic theory.

A brief discussion of a program for evaluating the integrals which appear in the Rydberg-Klein-Rees (RKR) method of determining potential curves from spectroscopic data is given. Application is made to the ground states of diatomic molecules of H and I and the results compared to earlier calculations. (Author)

AD-415 765 Div. 25
(TISTP/FEM) OTS price $2.60

Johns Hopkins U., Baltimore, Md.
TRANSIENT STUDIES OF IONIZATION AND DEIONIZATION PROCESSES IN GASEOUS DISCHARGES.
Final summary rept.,
by Donald E. Kerr. 31 July 60, 25p.
Contract AF18 600 363
AFOSR TR60 110 Unclassified report

Descriptors: (*Gas discharges, Ionization), (*Recombination reactions, Plasma medium), (*Plasma medium, Helium), Electron density, Ions, Diffusion, Microwave frequency, Absorption, Light, Monochromatic light, Photomultipliers, Molecular spectroscopy, Energy, Dissociation.

The major results of this work are: (1) a large quantity of new quantitative information has been obtained on the behavior of the electron concentration in and light radiated from a helium plasma; (2) this information has led to the discovery that many earlier ideas about the afterglow mechanisms were incomplete or inaccurate; (3) the direction in indicated for investigation of further questions which must be answered befor a reasonable understanding of ionization and deionization processes in low-energy plasmas is obtained. (Author)

AD-415 796 Div. 25
(TISTM/TLG) OTS price $9.60

Vitro Labs., Silver Spring, Md.
PHYSICS OF MICROBUBBLES,
by W. R. Turner. 30 Aug 63, 114p. Technical note 01654 01 2
Contract Nonr315900, Proj. NR186 401
Unclassified report

Descriptors: (*Bubbles, Physical properties), (*Cavitation, Theory), Nucleation, Underwater sound, Ultrasonic properties, Sound transmission, Attenuation, Stability, Water.

A bubble model is developed in which a compressed wall of particles supports a portion of the hydrostatic pressure, neutralizing the out-diffusion of gas and the buoyancy to produce stabilization. Other suggested effects are an increase of bubble resonant frequency, a reduction of damping, and a critical size marking a transition between a radius controlled cavitation threshold to one primary controlled by the dissolved gas pressure. The implications to cavitation and sound propagation are explored. Scattered experimental evidence suggests that microbubble concentrations occasionally exceed critical limits. (Author)

AD-415 808 Div. 25
(TISTE/CAM) OTS price $9.10

Naval Postgraduate School, Monterey, Calif.
PROPERTIES OF HIGH CURRENT SUPERCONDUCTING MAGNET COILS,
by Robert H. Finley and Richard T. Martin. 1963, 100p.
Unclassified report

Master's thesis.

Descriptors: (*Superconductors, Solenoids), (*Solenoids, Superconductors), Electric wire, Superconductivity, Electric current, Magnetic fields, Cooling, Wiring diagrams, Measurement, Tables, Single crystals, Crystal growth.

In connection with the fabrication of an adiabatic demagnetization cooling device, the properties of some high current superconducting magnet coils have been studied. This thesis includes investigations of critical current vs. magnetic field for Nb3Zr coils wound with several packing fractions. The coils were wound bifilar in order that conditions of zero net field could be studied, as well as the properties of single and multiple layers of windings. The problems of connections to the NbeZr wire and the thermal expansion of the wire were investigated. An experiment was conducted to determine the optimum size current lead for various currents. A design is presented for a magnetic cooling device utilizing the magnet. Techniques have been developed for growing large single crystals or ferric ammonium sulfate alum for use with the device. (Author)

AD-415 829 Div. 25
(TISTP/MFA) OTS price $3.60

Pittsburgh U., Pa.
AFTERGLOW ATOMIC COLLISION PROCESSES.
Joint technical rept.,
by Manfred A. Biondi. 20 Aug 63, 1v. Technical rept. no. 1, App. no. 3
Contract Nonr62406
Unclassified report

Descriptors: (*Gas ionization, Atomic properties), (*Atomic spectroscopy, Plasma medium), Probes (Electromagnetic), Electrostatics, Microwaves, Radiofrequency, Interferometers, Optical properties, Mass spectroscopy, Electron density, Ions, Measurement, Electrons, Scattering, Atoms.

Information is presented concerning atomic collisions involving electrons, ions, excited atoms, and normal atoms at near-thermal energies which has been obtained from afterglow studies, that is, from the study of the behavior of an ionized gas following the removal of external ionizing agents. We shall first describe briefly some of the principal techniques which have been used in afterglow investigations, then discuss the classes of atomic collision processes which have been successfully studied by these methods, and finally choose representative examples to illustrate the scope of the atomic collision measurements. (Author)

AD-415 832 Div. 25
(TISTM/AMS) OTS price $1.10

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
X-RAY DIFFRACTION STUDIES OF THERMAL MOTIONS IN CRYSTALS.
Quarterly progress rept. no. 16, 1 Mar-31 May 63. 6 Aug 63, 8p.
Contracts Nonr99100 and Nonr99106, Proj. NR017 623
Unclassified report

Descriptors: (*Crystals, Thermal stresses), X-ray diffraction analysis, Vibration, Silver compounds, Chlorides, Ions, Motion, Temperature, Specific heat.

Division 25 - PHYSICS

AD-415 862 Div. 25, 15
(TISTM/TCG) OTS price $1.10

Catholic U. of America, Washington, D. C.
MEAN FREE PATH IN DENSE GASES AND LIQUIDS,
by P. H. E. Meijer and J. I. Bowen. 29 Mar 59, 8p. Technical note SM2
Contract AF49 638 452
AFOSR IN59 694 Unclassified report

Descriptors: (*Liquids, Kinetic theory), (*Gases, Kinetic theory), (*Kinetic theory, Differential equations), Atoms, Density, Motion, Statistical analysis, Fluids.

The objective of this research was to derive a simple expression for the mean free path in a fluid. The derivation used is strictly speaking only correct for hard sphere atoms. It is shown that low densities give the usual exponential distribution and that the high density limit, in which the atoms are supposed to be boxed in, gives rise to a mean free path equal to the reduced length of the box. Under the assumption that it is proper to make use of the general properties of the two particle correlation function some tentative conclusions are made about the behavior of the mean free path as a function of the density. (Author)

AD-415 890 Div. 25, 20, 4
(TISTM/ODN) OTS price $1.60

Cornell U., Ithaca, N. Y.
A MASS SPECTROMETRIC AND THERMODYNAMIC STUDY OF GASEOUS TRANSITION METAL (II) HALIDES,
by Richard C. Schoonmaker, Alan H. Friedman and Richard F. Porter. 1959, 14p.
Contract AF18 603 1
AFOSR TN59 668 Unclassified report

Descriptors: (*Thermodynamics, Vapors), (*Halides, Mass spectroscopy), (*Mass spectroscopy, Halides), Iron compounds, Chromium compounds, Manganese compounds, Cobalt compounds, Nickel compounds, Iodides, Chlorides, Bromides, High temperature research, Transition elements, Chemical equilibrium, Mass spectrum, Vapor pressure, Thermochemistry, Data, Vaporization.

Mass spectrometric and Knudsen effusion techniques were used to study the vaporization of several transition metal (II) halides. The systems studied include FeI2 and the chlorides and bromides of Cr, Mn, Co and N1. The overall temperature range was between 440 and 700 C. For all systems the monomer is the major vapor species in the temperature range studied. Dimeric species were detected in the vapor phase for all systems except Ni C12 and NiBr2. Vapor pressure data were combined with mass spectrometric and entropy data to give heats for the dimerization reaction: 2MX2 (g) + M2X4 (g). (Author)

AD-415 891 Div. 25
(TISTM/EJH) OTS price $1.10

Crystal Research Lab., Pennsylvania State U., University Park.
X-RAY STUDIES OF COMPLEX IONS AND THEIR SALTS WITH ORGANIC BASES AND ORGANIC OXYGEN COMPOUNDS. Summary final rept.,
by Ray Pepinsky. 1 Oct 59, 4p.
Contract AF18 600 1556
AFOSR TR59 184 Unclassified report

Descriptors: (*Organic compounds, X-ray diffraction analysis), (*X-ray diffraction analysis, Organic compounds), (*Ions, X-ray diffraction analysis), (*Complex compounds, X-ray diffraction analysis), (*Crystal structure, Organic compounds), Crystallization.

A method whereby the molecules to be studied can be crystallized in structures whose X-ray analysis would be certain of success is discussed. The method is described under the title of ''crystal engineering'' or ''crystal designing''. In essence, the method involves precipitation in crystalline form of the organic molecules, generally in ionic form, but diluted structurally by sizable groups of atoms of the class known as complex ions, which dominate the packing of the structures. The structure of these complex ions is generally known, and in any case readily determinable. They contain heavier atoms of the sort necessary both for application of the classical ''heavy-atom'' x-ray method. The entire complec ion is very effective in establishing phases of the scattered x-rays, and thus in analyzing the entire structure. The organic ions are always located in spaces between the complex ions, simplifying analysis. A new method of crystal analysis is reported by means of which structure and absolute configuration of a non-centric crystal can be determined. (Author)

AD-415 909 Div. 25
(TISTP/WH) OTS price $8.60

Pennsylvania State U., University Park.
SPHERICAL SHOCK WAVES IN SOLIDS,
by Harry H. Calvit and Norman Davids. 9 July 63, 80p. TR no. 2
Contract DA36 034ORD3576RD
Unclassified report

Descriptors: (*Mechanical waves, Solids), (*Solids, Mechanical waves), Metals, Deformation, Equations of state, Aluminum, Blast, Shock waves, Elasticity, Plasticity, Differential equations, Numerical methods and procedures.

AD-415 914 Div. 25
(TISTP/MH) OTS price $12.50

Massachusetts Inst. of Tech., Cambridge.
NONLINEAR VIBRATIONS: A COMPARATIVE STUDY WITH APPLICATIONS TO CENTRIFUGAL PENDULUM VIBRATION ABSORBERS,
by D. E. Newland. May 63, 1v.
Grant 154 63
AFOSR 5224 Unclassified report

Doctoral thesis.

Descriptors: (*Vibration, Absorption), Resonance, Differential equations, Energy, Aircraft equipment, Internal combustion engines, Torque, Analysis.

This thesis is in two parts. Part 1 is a comparative study of methods for the analysis of nonlinear vibrations. It is primarily concerned with forced vibrations, and is restricted to lumped parameter systems (systems with a finite number of degrees-of-freedom). Part 2 is the application of the most suitable of these methods to problems occurring in the design of centrifugal pendulum vibration absorbers. (Author)

AD-415 921 Div. 25, 15, 9
(TISTP/HG) OTS price $5.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
NORMAL SHOCK WAVE CALCULATIONS IN AIR AT FLIGHT SPEEDS UP TO 25,000 FT./SEC,
by C. A. Cook, L. M. Gilbert and S. M. Scala.
Nov 62, 48p. Rept. no. R62SD76
Contract AF04 694 222
Unclassified report

Descriptors: (*Shock waves, Air), (*Thermodynamics, Hypersonic flow), Atmosphere models, Digital computers, Equations, Velocity, Pressure, Temperature, Density.

New calculations of the equilibrium gas properties behind a normal shock wave are presented based on the 1959 ARDC Model Atmosphere. Graphs of pressure, density, and temperature are presented for conditions behind a normal shock wave and at the stagnation point following an isentropic compression, for high altitude hypersonic flight. The regime treated covers altitude from 100,000 feet to 400,000 feet in increments of 2000 feet, and a range of flight speeds from 10,000 to 25,000 feet per second. (Author)

AD-415 922 Div. 25, 15
(TISTP/MH) OTS price $1.60

Polytechnic Inst. of Brooklyn, N. Y.
ENERGY SOLUTION FOR SIMPLY SUPPORTED SHORT OVAL SHELLS,
by William P. Vafakos, Neil Nissel and Joseph Kempner. Aug 63, 12p. 667
Contract Nonr83914, Proj. NR064 167
Unclassified report

Descriptors: (*Stresses, Structural shells), (*Structural shells, Stresses), Energy, Boundary value, Problems, Hydrostatic, Pressure, Fourier analysis, Equations, Differential equations, Deflection.

A previously reported upon energy solution is applied to simply supported short oval shells having major-to-minor axis ratios up to 2.06. The energy solution, which is applicable to shells having arbitrary boundary conditions, is shown to be in good agreement with an exact solution. (Author)

AD-415 929 Div. 25, 4
(TISTM/AM) OTS price $2.60

Research Inst., Temple U., Philadelphia, Pa.
PLASMA JET CHEMISTRY.
Final rept. 1 Jan 62-1 Jan 63,
by A. V. Grosse, C. S. Stokes, J. A. Cahill, and J. J. Correa. 30 June 63, 26p.
Contract Nonr308502, Proj. NR052 429
Unclassified report

Descriptors: (*Chemical reactions, Plasma jets), (*Plasma jets, Chemical reactions), High temperature research, Preparation, Direct current, Radiofrequency, Organic compounds, Nitrogen compounds, Oxides, Data, Helium, Cyanides, Hydrogen compounds, Analysis.

Generation of high temperatures for industrial processing, industrial chemical reactions carried out using plasma jets as heat sources, plus the possibilities of plasma engines for space transportation, are all fields which will benefit greatly in future years from the wide research now being conducted in plasma chemistry and physics. The scope of these studies is the investigation of high temperature chemical reactions utilizing the plasma jet as the source of thermal energy. (Author)

AD-415 939 Div. 25, 15
(TISTP/HG) OTS price $2.60

Oregon U., Eugene.
ARE BLOCH BANDS AT FINITE ELECTRIC FIELD ADIABATICALLY CONNECTED TO THOSE AT ZERO FIELD,
by G. H. Wannier and J. P. VanDyke. 1962, 20p.
Technical rept. no. 2
Contract NONR2771 05, Proj. NR017 633
Unclassified report

Descriptors: (*Field theory, Electric fields), Elementary particles, Electric potential, Selection rules, Mathematical models, Oscillations, Taylor's series, Functions, Differential equations, Partial differential equations, Integral transforms, Integrals, Sequences, Operators (Mathematics).

If a potential consists of a superposition of a periodic part and a uniform electric field then for a particle moving in this field there are Bloch bands closed in time. The present report addresses itself to the question whether these bands may be identified with the field-free bands. The most natural thing is to expect that the bands are slightly field dependent, but converge toward the field-free bands as E goes to zero. Bands for which this is true are said to be adiabatically connected to corresponding bands at zero field. Two model cases are given for which this adiabatic connection pertains. The central part of the report provides the conclusion that the answer to the question in the report title is almost always negative. In this proof the positive cases serve an essential function. It is shown that the parameters of the periodic potential must obey at least one supplementary condition to allow adiabatic connection, and that the collected cases precisely obey this condition. Adiabatic connection is thus generally not possible. There is given an explicitly soluble case which does not allow adiabatic connection. (Author)

AD-415 944 Div. 25, 9
(TISTM/TCG) OTS price $2.60

Princeton U., N. J.
HEAT TRANSFER THROUGH A REGION OF CLOSED-STREAMLINE,
by S. H. Lam. May 59, 23p. Rept. no. 469
Contract AF49 638 465, Proj. 9781
AFOSR TN59 727 Unclassified report

Descriptors: (*Heat transfer, Boundary layer), (*Boundary layer, Heat transfer), Hypersonic flow, Aerosynamic heating, Partial differential equations.

AD-415 947 Div. 25
(TISTP/MFA) OTS price $3.60

Microwave Research Inst. Polytechnic Inst. of Brooklyn, N. Y.
A STUDY ON GENERATION, SHAPING AND CONTROL OF HIGH-POWER ELECTRIC PULSES.
Final rept.
by E. Levi. 15 Apr 63, 26p. Rept. PIBMRI1154 63
Contract AF30 602 2149
RADC TDR63 208
Unclassified report

Descriptors: (*Electromechanical converters, Design), Electrodes, Discharge tubes, Electric discharges, Electromagnetic fields, Plasma medium, Energy conversion, Ionization, Diffusion, Physical properties, Ionization chambers, Measurement, Spectroscopy, Line spectrum, Electron density, Tests.

Devices have been developed, capable of generating high-energy electrical pulses, directly by means of electromechanical power conversion, thus eliminating the need for intermediate storage in electrical form. Units, having overall dimensions comparable with those of a medium-sized turbogenerator, can be built, to deliver energies up to 10 to the 10th power Joules in one second and 10 to the 8th power Joules in a few milliseconds. Small scale models have been constructed and tested. More advanced schemes to further increase the power output per unit volume, by employing gaseous plasmas, have been studied. A gaseous electronic device has been developed, capable of switching electrical power at high level, without relying for its operation on the presence of electrodes. Units having a switching power of 25MW have been constructed and tested. Extensive studies have been conducted on basic problems in high-power gaseous electronics, such as diffusion and mobility of the ionized constituents, ionization build-up and decay, hydromagnetic stability of the electric discharge. (Author)

AD-415 976 Div. 25
(TISTM/TCG) OTS price $1.60

Stevens Inst. of Tech., Hoboken, N. J.
(No title).
Status rept., 1 Apr-30 June 63,
by Hans Meissner. 1 July 63, 13p.
Contract Nonr263 32
Unclassified report

Descriptors: (*Gold, Films), (*Tin, Films), (*Microwave spectroscopy, Gold), (*Surfaces, Resistance (Electrical)), Electrodeposition, Copper, Absorption, Superconductors, Superconductivity, Cryogenics, Penetration.

In order to further investigate effects of superconducting, and specifically to look for direct evidence of an energy gap in the normal conductor, measurements of microwave absorption at 9.2 kilomegacycles were made in films of Au and Cu electroplated onto bulk Sn. The samples consisted of cast Sn plates which were electropolished and then electroplated with the normal metal. The thicknesses were determined by plating and weighing of calibration samples. A schematic diagram of the cavity and endplates and some curves of surface resistance are given relative to the copper plate versus temperature for the gold-tin samples. (Author)

AD-415 980 Div. 25, 15
(TISTP/HG) OTS price $1.60

Catholic U. of America, Washington, D. C.
LINEARITY AND MINIMUM ENTROPY PRODUCTION.
Final rept.
1963, 13p.
Contracts AF49 638 452 and AF18 603 120
AFOSR TR59 178 Unclassified report

Descriptors: (*Entropy, Production), (*Thermodynamics, Irreversible processes), (*Probability, Measure theory), Particles, Energy, Momentum, Thermal conductivity, Fluxes, Differential equations, Integrals, Functions, Statistical analysis, Statistical mechanics.

AD-415 984 Div. 25
(TISTP/MH) OTS price $10.50

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
THEORY OF THROUGHFLOW IN AXIAL TURBOMACHINES WITH VARIABLE WALL GEOMETRY,
by Gordon C. Oates. Aug 59, 124p. Technical note no. 1
Contract AF49 638 497
AFOSR RN59 680 Unclassified report

Descriptors: (*Axial-flow turbines, Fluid flow), Turbines, Mixed-flow compressors, Turbine blades, Fluid mechanics, Perturbation theory, Velocity, Rotor blades.

The theory of three-dimensional flow in axial turbomachines was extended to include the effects of variable hub and tip radii such as occur in the entrance stages of conventional axial flow compressors and, to a larger extent, in mixed flow compressors. The problem is simplified by assuming an infinite number of infinitely thin blades in each blade row, so that axially symmetric fluid motion results. The effect of variable hub and tip radii of the annulus walls is investigated when the tangential velocities are small but arbitrary, and when they are large but of special form. The combined effect of heavily loaded inlet guide vanes and variable hub radius is also investigated for the case in which the inlet guide vanes impart a motion very nearly of the solid-body type. The boundary conditions for the variable hub radius require linearization, thus restricting the magnitude of posturbation to be induced by the wall. Finally, the effect of a loaded blade row placed behind the inlet guide vane is determined. The local axial and tangential velocities induced by the variable wall radius were found to be of the same general magnitude as the velocities induced by a normal rotor or stator blade row. Although the forms of the solutions are somewhat complex for routine application in turbomachine design, a sufficiently simple approximate result is obtained for one case and it is indicated how the method of approximation may be extended. (Author)

AD-415 985 Div. 25
(TISTP/MH) OTS price $9.10

Maryland U., College Park.
VIBRATIONAL THERMODYNAMIC PROPERTIES OF LATTICES WITH DEFECTS,
by Jagadishwar Mahanty. Aug 59, 95p. Technical rept. no. 145
Contract AF49 638 399
AFOSR TN59 758 Unclassified report

Doctoral thesis.

Descriptors: (*Crystal lattice defects, Thermodynamics), Vibration, Models, Integrals, Functions, Frequency, Low temperature research, High temperature research, Isotopes.

Some techniques have been developed for evaluating the changes in the vibrational properties of a lattice due to the presence of defects, and they have been applied to the study of the effect of defects on some lattice models. The techniques are based on the work of Montroll who has given a method for obtaining integral expressions for the change due to defects in an additive function of the normal mode frequencies of a lattice. The integral expressions for the changes in vibrational thermodynamic properties are contour integrals of functions whose poles are distributed in such a way that integration becomes inconvenient. It is shown in this paper that if we restrict ourselves to the evaluation of the change in thermodynamic properties at low and high temperatures, the need for integrating over such singular functions can be avoided by using some special devices. These devices lead to some useful formulae which are employed in the study of the effect of isotope and substitutional impurities in one, two, and three dimensional lattices with nearest neighbour central and noncentral force interactions. Results are given for the low and high temperature values of the change in Helmholtz free energy due to defects in these cases. (Author)

AD-415 986 Div. 25
(TISTP/FEM) OTS price $9.60

Pittsburgh U., Pa.
STRENGTHS AND WIDTHS OF MOLECULAR SPECTRAL LINES IN THE INFRARED.
Final rept.,
by Harold Babrov, George Ameer and William Benesch. Dec 59, 109p.
Contract AF18 600 986
AFOSR TR59 207 Unclassified report

Descriptors: (*Spectra (Infrared), Line spectrum), (*Molecular spectroscopy, Dipole moments), Infrared spectrophotometers, Rotation, Energy, Intensity, Equations, Hydrogen compounds, Chlorides, Optical equipment, Optical filters, Monochromatic light.

The measurement of absolute line widths as a function of J for the vibration-rotation lines of the fundamental band of HCl is reported. Both self broadening and foreign gas broadening have been studied. The determination of the line strengths of this HCl band is also reported. Previous work is expanded to include a greater variety of broadening gases and some small corrections are made to previously published data. (Author)

AD-415 999 Div. 25
(TISTM/EJH) OTS price $2.60

Oregon State U., Corvallis.
SULFATE IONS IN ALKALI HALIDE CRYSTALS: INFRARED ABSORPTION AND EFFECTS ON ADDITIVE COLORATION,
by E. Howard Coker and Allen B. Scott. 1 Aug 63, 1v. TR6
Contract Nonr128605, Proj. NR018 701
Unclassified report

Report on A Magnetic Study of Color Centers in Alkali Halides.

Descriptors: (*Color centers, Potassium compounds), (*Potassium compounds, Color centers), (*Chlorides, Color centers), Halides, Alkali metal compounds, Magnetic properties, Sulfates, Ions, Spectra (Infrared), Single crystals, Impurities.

Single crystals of KCl containing sulfate ions have exhibited a large number of IR absorption peaks unless the crystals also contained an excess of divalent cations, in which case the spectra consist chiefly of 3 prominent absorbances. This paper reports observations on crystals where the divalent cation concentration was low enough so the spectra were complicated. Progress was made in accounting for the peaks observed. A crystal-to-melt distribution ratio for sulfate ions is reported which makes it convenient to estimate the sulfate concentration for a crystal grown from a melt of known composition. Since sulfate ions bear a double charge, one expects their incorporation in an alkali halide crystal to be accompanied by the formation of negative-ion vacancies. If such is the case, some pronounced effects upon the behavior of F centers may result. Experiments with crystals containing sulfate ions which were additively colored. The sulfate ions were reduced to other divalent anions (e.g. peroxide) by the coloration process; these anions then markedly affect the bleaching of F centers. (Author)

AD-416 001 Div. 25, 4
(TISTM/TCG) OTS price $2.60

Frick Chemical Lab., Princeton U., N. J.
INTERMOLECULAR POTENTIAL IN SOLID METHANE. II: COHESIVE ENERGY, CRYSTAL STRUCTURE, AND PHASE TRANSITION,
by S. Kimel, A. Ron, and D. F. Hornig. June 63, 23p. Technical rept. no. 16
Contract Nonr185827, Proj. NR014 203
Unclassified report

Descriptors: (*Solids, Alkanes), (*Phase studies, Alkanes), (*Crystal structure, Alkanes), (*Organic compounds, Alkanes), Crystal lattices, Molecular rotation, Molecular structure, Molecules, Atoms, Chemical reactions, Chemical bonds, Potential theory, Energy, Cryogenics, Sublimation.

The cohesive energy of crystalline methane is calculated for various possible structures, using a potential function consisting of repulsive and attractive interactions between non-bonded atoms. The necessary parameters were taken without atjustment from independent studies of other systems. It was found that the structures D sub 2d have the best packing. It is proposed that the lambda-type phase transition in methane at 20.4 K may be associated with a tetragonal distortion of the f.c.c. unit cell with no change in volume, since the calculated cohesive energy of methane is thereby increased. The maximum contribution of this distortion (about 1% of the total energy) occurs when the c-axis of the unit cell is elongated 12%. This change agrees reasonably well with the experimental heat of transition, 18.1 cal/mole, which is 0.8% of the sublimation energy of methane. The calculated stability of the crystal is not affected by slight displacements of the molecules along the c-axis. On the other hand, the calculated stability of the crystal decreases upon rotation or upon distortions from T sub d symmetry of the individual molecules in the lattice. (Author)

AD-416 006 Div. 25, 6
(TISTP/AMS) OTS price $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
THE SUPERCONDUCTOR ENERGY GAP AND ITS EXPLICIT

UTILIZATION IN RADIATION DETECTION,
by R. D. Hitchcock. 5 Aug 63, 48p.
Proj. Y R011 01 049
NCEL TN496 Unclassified report

Descriptors: (*Detection, Superconductors), (*Superconductors, Detection), Detectors, Superconductivity, Theory, Experimental data, Mathematical analysis, Electromagnetic waves, Particles, Ions, Photoelectric effect.

Specific results of the theory of superconductivity of Bardeen, Cooper, and Schrieffer are given, which can be used to calculate the expected performance of superconductors used for the detection of electromagnetic and particle radiation. The experiments of Glover and Tinkham, Giaever and Megerle, and others are described which give direct evidence that a temperature dependent energy gap exists in the electron spectrum of a superconductor. Data from these experiments are given which indicate that this gap is centered at the Fermi level and is approximately equal to 3.5 kT sub c at absolute zero. Calculations, based on the theoretical results and experimental data, are given which give an estimate of the expected performance of proposed superconductor devices for detecting radiation. It is estimated that a superconductor tunnel device should respond to radiation in the band, 0.22 to 1.0 mm, which includes frequencies, currently, both difficult to detect and generate. Proposed techniques for the detection of ionizing particles are also described. (Author)

AD-416 013 Div. 25
(TISTM/ODN) OTS price $1.10

AeroChem Research Labs., Inc., Princeton, N. J.
ON THE EFFECTS OF DIFFUSION AND CHEMICAL REACTION IN CONVECTIVE HEAT TRANSFER,
by Daniel E. Rosner. 8 June 59, 7p. Rept. no. TM13
Contracts AF49 638 300 and AF33 616 6216
AFOSR TN59 920 Unclassified report

Descriptors: (*Gases, Heat transfer), (*Heat transfer, Theory), Thermal conductivity, Diffusion, Dissociation, Laminar boundary layer, Equations, Chemical reactions, Recombination reactions, Thermal diffusion.

The notion of an 'effective' thermal conductivity for reacting gaseous mixtures is applied to the prediction of convective heat transfer rates when dissociation, diffusion and atom recombination take place within a laminar boundary layer in quasi-equilibrium. The result for the forward stagnation region of a cool blunt-nosed body is compared with recent solutions to the boundary layer equations. (Author)

AD-416 024 Div. 25
(TISTP/MFA) OTS price $10.10

Electro-Optical Systems, Inc., Pasadena, Calif.
HIGH INTENSITY PUMP FOR OPTICAL LASERS.
Final rept., 1 July 62-1 Apr 63,
by G. L. Clark, N. C. Chase and H. R. Moore.
Aug 63, 113p. Rept. no. 3270
Contract AF33 657 8805, Proj. 5237, Task 523701
ASD TDR63 651 Unclassified report

Descriptors: (*Lasers, Exploding wires), Design, Energy conversion, Capacitors, Measurement, Fluorescence, Tungsten, Optical properties, Plasma medium, Photomultipliers, Sensitivity, Band-pass filters, Absorption, Liquids, Reflectors, Furnaces, Control systems.

The development, construction, and testing of a laser head in which the source of pump radiation is the dense hot plasma produced by electrically exploded wires is described. A capacitor bank energy storage system was constructed which has a maximum capability of 150,000 Joules at 20 KV. It consists of nine independent sections which can be operated in any parallel combination. The capacitor sections are switched with ignitrons, the measured ringing frequency being 50 KC/sec with a rise time of 5 x 10 to the -6th sec. Utilizing one section of the energy storage system, the radiation characteristics of electrically exploded tungsten wires were evaluated over the wavelength range 2500 - 8500 Angstroms using a plane grating spectrograph. The peak spectral radiance of exploding tungsten wires was measured at 5460 Angstroms using an absolutely calibrated photomultiplier detector and narrow band filter combination. The problem of efficiently transferring the radiation from an exploding light source into a laser rod was considered. Some conclusions were drawn with regard to the optical aspects of this problem sufficient to allow the design and construction of a multiple exploding wire laser head. The multiple exploding wire laser head, the energy storage system, and the control system have satisfactorily undergone electrical tests. (Author)

AD-416 040 Div. 25
(TISTM/TLG) OTS price $14.00

National Bureau of Standards, Washington, D. C.
TABLES OF THERMODYNAMIC PROPERTIES OF AIR IN CHEMICAL EQUILIBRIUM INCLUDING SECOND VIRIAL CORRECTIONS FROM 1500 DEGREES K TO 15,000 DEGREES K,
by Joseph Hilsenrath and Max Klein. Aug 63, 203p.
AEDC TDR63 161 Unclassified report

Descriptors: (*Air, Thermodynamics), (*Thermodynamics, Tables), High temperature research, Dissociation, Ionization, Chemical equilibrium, Enthalpy, Entropy.

Tables for the thermodynamic properties for air are presented which take into account the effect of dissociation and ionization and the limiting-law Debye-Huckel and second virial corrections, upon the thermodynamic properties and the equilibrium compositions. Values are tabulated from 1500 K in steps of 100 to 15,000 K at close spacings in the logarithm of the density for the compressibility factor Z = PV/RT; the dimensionless functions for: internal energy, E/RT; enthalpy, H/RT; entropy, S/R; log P (atm) and Z* = Ci. The effects of the real gas corrections on the equilibrium properties are illustrated graphically. The equilibrium composition is given for selected temperatures over the tabulated density range. The wide range of temperatures and densities over which the thermodynamic properties have been tabulated make the tables useful in a variety of engineering design and test programs, and in scientific research and development. (Author)

AD-416 053 Div. 25
(TISTM/BRW) OTS price $1.60

Watervliet Arsenal, N. Y.
BENDING STRESSES IN CYLINDRICAL SHELLS,
by R. E. Weigle and R. D. Sutherland. Aug 63, 13p.
Proj. 501 01 033
WVT RR6301 Unclassified report.

Descriptors: (*Structural shells, Cylindrical bodies), (*Cylindrical bodies, Deflection), (*Stresses, Mathematical analysis), Differential equations, Moments, Shear stresses, Numerical analysis.

The problem considered is that of a cylindrical shell composed of a semi-infinite length shell joined to a finite length shell of smaller thickness, subjected to internal pressure. The finite length shell is assumed to join smoothly either at the inner or the outer surface of the thicker shell. Use is made of the general solution of the differential equation governing the displacement perpendicular to the center surface of the shell. The constants of integration are evaluated by imposing the conditions that the bending moment and shearing force are zero at the free end of the shell and that the displacement, slope, bending moment and shearing force are continuous at the joining of the two portions of the shell. (Author)

AD-416 056 Div. 25
(TISTM/TLG) OTS price $2.60

Northwestern Technological Inst., Evanston, Ill.
CRYSTALLOGRAPHIC ANGLES FOR ALPHA MERCURY,
by A. C. Arko, J. Cotner and J. Weertman. Aug 63, 21p. Technical note no. 1
Contract AF49 638 1041
Unclassified report

Descriptors: (*Mercury, Crystal structure), Cryogenics.

AD-416 057 Div. 25, 31
(TISTM/BRW) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
THE ELASTIC BUCKLING STRENGTH OF NEAR-PERFECT DEEP SPHERICAL SHELLS WITH IDEAL BOUNDARIES,
by Martin A. Krenzke. July 63, 17p.
Proj. S F013 03 02
DTMB Rept. no. 1713 Unclassified report

Descriptors: (*Spheres, Buckling (Mechanics)), Structural shells, Buckling (Mechanics)), Hemispherical shells (Buckling (Mechanics)), Elasticity, Stiffened cylinders, Deflection, Analysis, Theory, Experimental data, Test methods, Hydrostatic pressure, Submarine hulls, Structures, Mathematical analysis, Model tests.

Two accurately machined hemispherical shells bound by ring-stiffened cylinders designed to provide ideal edge conditions were tested under hydrostatic pressure to determine the elastic buckling strength of near-perfect deep spherical shells. Ratios of experimental collapse pressure to the pressure calculated by using the classical small-deflection theory of 0.73 and 0.90 were obtained. The ratio of 0.90 is considerably higher than the ratios obtained in previous tests recorded in the literature. Since these models had small, unavoidable imperfections, the experimental results lend considerable support to the validity of the small-deflection analysis for the elastic buckling strength of initially perfect spheres. (Author)

AD-416 121 Div. 25
(TISTP/JP) OTS price $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
IMPACT ON AN ELASTICALLY CONNECTED DOUBLE BEAM SYSTEM,
by J. M. Seelig and W. H. Hoppmann, II. July 63, 26p.
Contract DA30 069AMC195 R
Unclassified report

Descriptors: (*Impact shock, Differential equations), (*Structural parts, Impact shock), Beams (Structural), Elasticity, Structures.

Differential equations of motion of an elastically connected double beam system subjected to an impulsive load are discussed mathematically. In addition to the theory there is presented a description of impact experiments on double beams. Theoretically and experimentally determined strains as functions of time are compared in the form of curves. The agreement is remarkably good for the type of load used. (Author)

AD-416 128 Div. 25
(TISTP/FEM) OTS price $7.60

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
STUDIES ON ELECTROMAGNETIC MEANS OF ADDING HEAT AND KINETIC ENERGY TO A GAS,
by Eugene E. Covert, Charles W. Haldeman, James B. Coffin, Jr. and Laurence R. Boedeker. May 63, 68p.
Contract AF33 657 7975, Proj. 7065, Task 706501
ARL 63 84 Unclassified report

Descriptors: (*Plasma medium, Acceleration), (*Electromagnetic waves, Plasma medium), (*Gas ionization, Instrumentation), Design, Electrical conductance, Low temperature research, Heating, Radiofrequency, Ionization, Traveling wave tubes, Pumping (Electronics), Energy, Electric fields, Very high frequency, Gases, Plasma jets.

One-dimensional studies of plasma acceleration by traveling electromagnetic waves, studies of a consistent instrumentation procedure, and studies to determine the feasibility and design of an ilternating current gas ionizing device that will, by use of nonequilibrium processes, give a high electrical conductivity at relatively low temperatures are presented. (Author)

AD-416 139 Div. 25
(TISTP/JP) OTS price $2.60

Bureau of Mines, Pittsburgh, Pa.
HIGH SPEED AERODYNAMICS AND JET PROPULSION. VOLUME II, SECTION F. MECHANICS OF REACTING CONTINUA,
by John M. Richardson and Stuart R. Brinkley, Jr. 14 Nov 51, 21p.
Proj. PX3 108
BM P Rept. no. 1082 Unclassified report

Descriptors: (*Continuum mechanics, Reaction kinetics), Irreversible processes, Thermodynamics, Transport properties, Antropy, Exhaust flames, Combustion.

Contents: Fundamental Equations--State variables, A kinematical theorem, Transport of chemical species, Transport of momentum, Transport of energy, Summary and alternative forms; Application of the Phenomenological Theory of Irreversible Processes--Entropy transport and Currents, forces and kinetic coefficients.

AD-416 148 Div. 25, 17
(TISTM/TCG) OTS price $1.00

Southwest Research Inst., San Antonio, Tex.
THE EFFECT OF TRANSIENT CREEP ON THE COLLAPSE TIME OF CYLINDERS AND CONES UNDER EXTERNAL PRESSURE.
Final technical rept. 22 Jan 62-15 Mar 63, by E. Z. Stowell and E. M. Briggs. Aug 63, 27p.
Contract AF33 657 8125, Proj. 7063, Task 7063 02
ARL 63 132 Unclassified report

Descriptors: (*Conical bodies, Creep), (*Cylindrical bodies, Creep), (*Aluminum alloys, Creep), Pressure, Deformation, Vicoelasticity, Time, Equation of state, Deflection, Test methods, Theory, Stresses.

Previous attempts to compute the collapse time for cylinders under external pressure at elevated temperatures had used the assumption of steady-state creep. In many cases the computed collapse times were larger than those indicated by tests. In this work similar computations were made of the collapse time but including the effect of the transient creep which precedes the onset of the steady state. The inclusion of the transient creep had the effect of reducing the time to collapse in many cases. Comparison of the predicted times with published experimental times for cylinders and cones under various conditions showed that the probable error in prediction was reduced in all cases by the inclusion of transient creep. The most accurate predictions were obtained for the cylinders with fixed ends, for which the collapse time could be determined with a probable error of 28%. (Author)

AD-416 152 Div. 25
(TISTM/TLG) OTS price $1.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
SATURATION EFFECTS IN FERRIMAGNETIC RESONANCE,
by P. E. Seiden and H. J. Shaw. Oct 59, 8p.
ML no. 653
Contract AF49 638 415
AFOSR TN59 1185 Unclassified report

Reprint from Jnl. of Applied Physics, Vol. 31, pp. 2255-2265, May 1960. (Copies also available from DDC)

Descriptors: (*Garnet, Magnetic properties), Magnetic fields, Radiofrequency, Yttrium compounds, Iron compounds, Ferrites.

Saturation curves of susceptibility as a function of rf magnetic field have been measured for a number of samples of polycrystalline yttrium iron garnet of varying linewidth. The curves exhibit a region of susceptibility linear in 1/h at high rf powers. The region of the initial decline in susceptibility is linear in h(squared) which is predicted both by a small signal relation derived from Callen's ferromagnetic dynamical equation and by a calculation of Schlomann which includes inhomogeneity interactions. A new method of determining the critical field for spinwave build-up is discussed. This method takes account of the fact that the initial decline in susceptibility is not simply due to the Suhl mechanism for saturation in ferrites. (Author)

AD-416 156 Div. 25, 13
(TISTM/BRW) OTS price $6.60

IIT Research Inst., Chicago, Ill.
FEASIBILITY STUDY OF METHODS FOR DYNAMIC THREE DIMENSIONAL PHOTOELASTICITY.
Final rept., 15 May 62-15 Feb 63, by John Vieira and W. F. Riley. June 63, 55p.
Contract AF29 601 5362, Proj. 1080. Task 108001
AFSWC TDR63 48 Unclassified report

Descriptors: (*Stresses, Photoelasticity), (*Photoelasticity, Feasibility studies), Mathematical analysis, Dynamics, Test methods, Model tests, Impact shock, Loading (Mechanics), Instrumentation, Calibration, Blast, Underground structures, Strain (Mechanics), Polariscopes, Polarographic analysis, Photographic analysis, Nuclear explosion damage, Shock waves.

The feasibility of using photoelasticity and moire methods to obtain dynamic three-dimensional stress distributions was investigated. The photoelasticity methods considered include scattered light techniques, embedded polariscopes, and embedded photoelastic layers in optically insensitive materials. During the course of the program the physical and optical properties of a number of model materials were determined, the effect of stress upon Polaroid materials was established, and several preliminary model studies were conducted using impact loadings. As a result of these experiments, the embedded polariscope technique has been selected as the most suitable method for immediate application to dynamic three-dimensional problems. The instrumentation and calibration procedures required for studies of this type are discussed. (Author)

AD-416 165 Div. 25
(TISTP/FEM) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
SHOCK WAVES, DISLOCATIONS, AND THEIR INTERACTIONS,
by Paul Harris and S. J. Jacobs. Sep 63, 25p.
NOL TR63 94 Unclassified report

Descriptors: (*Shock waves, Metals), (*Explosions, Dynamics), Models (Simulations), Detonations, Experimental data, Propagation, Stresses, Pressure, Solids, Elasticity, Theory, Loading (Mechanics), Motion, Numerical analysis, Plasticity, Hardening.

The existing macroscopic elastic-plastic theory is developed in a hopefully simple manner. Those aspects of the theory which are of special importance to shock propagation in solids, and which relate to the microscopic extension of the theory, are treated in length. The 'hydrodynamic' equations are written in the elastic-plastic spirit and should be usable by an experimentalist regardless of the exact microscopic processes involved. A gross theory is hypothesized to account for known phenomena associated with the shock loading of solids. In particular it is put forward that dislocations are generated within the region associated with the plastic wave front with the number generated being controlled by the applied normal stress-strain law for the material in question. (Author)

AD-416 167 Div. 25
(TISTM/AMS) OTS price $11.00

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
THE FREE VIBRATIONS OF THICK, COMPOSITE, ORTHOTROPIC, CIRCULAR CYLINDRICAL SHELLS,

by Hyman Garnet, Jacques Crouzet-Pascal and Frank Nolan. Aug 63, 122p. Grumman research department rept. RE165; Technical rept. no. 3
Contract Nonr346500FBM, Proj. NR064 463
Unclassified report

Descriptors: (*Cylindrical bodies, Sandwich construction), (*Sandwich construction, Cylindrical bodies), (*Vibration, Cylindrical bodies), Statics, Dynamics, Mechanics, Geometric forms, Theory, Elasticity, Equations, Thickness, Scattering, Programming (Computers), Load distribution, Stresses, Deformation, Mathetmatical analysis.

The equations governing the free vibrations of a thick orthotropic core circular cylindrical sandwich shell are developed. The solution is presented for the case of simple support edge conditions. The technique for obtaining the solution represents a departure from the usual study of free vibrations in not following the customary procedure of eliminating the force quantities from the equations of motion. Instead, the mixed system of force and displacement quantities is utilized directly. Comparisons are made with limiting cases obtained from an exact solution in the theory of elasticity and very good agreement is obtained. In addition, parameter studies are presented. These indicate the existence of several factors which have a dominant influence on the frequencies. These factors are: core orthotropy; relative strength of the face plates and core; relative strength of the face plates; relative masses of the face plates and core. (Author)

AD-416 197 Div. 25, 17
(TISTM/ODN) OTS price $1.10

Pennsylvania U., Philadelphia.
(No title).
Status rept.,
by K. R. Atkins and Max E. Caspari. 1 July 63, 2p.
Contract Nonr55128
Unclassified report

Descriptors: (*Cryogenics, Specific heat), (*Ferrites, Manganese compounds), Magnetic fields, Copper alloys, Nickel alloys, Magnetic properties, Nuclear magnetic resonance, Anisotropy.

AD-416 198 Div. 25, 4
(TISTM/ODN) OTS price $2.60

Oregon State U., Corvallis.
SULFATE IONS IN ALKALI HALIDE CRYSTALS: INFRARED ABSORPTION AND EFFECTS ON ADDITIVE COLORATION,
by E. Howard Coker and Allen B. Scott. 1 Aug 63, 27p. Technical rept. no. 6
Contract Nonr128605, Proj. NR018 701
Unclassified report

Report on A Magnetic Study of Color Centers in Alkali Halides.

Descriptors: (*Alkali metal compounds, Halides), (*Color centers, Halides), (*Crystals, Color centers), (*Sulfates, Impurities), Ions, Spectra (Infrared), Absorption spectrum, Single crystals, Potassium compounds, Chlorides, Crystal growth, Distribution, Crystal structure, Calcium compounds, Cryogenics, S band.

Recently it was reported that single crystals of KCl containing sulfate ions exhibited a surprisingly large number of infrared absorption peaks unless the crystals also contained an excess of divalent cations, in which case the spectra consisted chiefly of three prominent absorbances. These were ascribed to the asymmetric stretching mode of sulfate, triply split by neighboring divalent cations. This paper reports observations on crystals in which the divalent cation concentration was much lower; the spectra are more complicated but some progress has been made in accounting for the peaks observed. Also reported is a crystal-to-melt distribution ratio for sulfate ions, which makes it convenient to estimate the sulfate concentration for a crystal grown from a melt of known composition. Since sulfate ions bear a double charge, one expects their incorporation in an alkali halide crystal to be accompanied by the formation of negative-ion vacancies. If such is the case, some pronounced effects upon the behavior of F centers may result. (Author)

AD-416 223 Div. 25
(TISTM/TCG) OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
PARAMAGNETIC RESONANCE ABSORPTION BY THE TITANIUM (+3) ION IN CORUNDUM,
by J. G. Castle, Jr., D. W. Feldman, David C. Burnham and Carl Pitha. 22 May 63, 14p. Quarterly scientific rept. 3
Contract AF19 628 1640, Proj. 4608, Task 460803
AFCRL 63 171 Unclassified report

Descriptors: (*Titanium compounds, Paramagnetic resonance), (*Corundum, Paramagnetic resonance), (*Paramagnetic resonance, Absorption), Ions, Aluminum compounds, Oxides, Theory, Spin, Atomic energy levels, Microwave spectroscopy, Optical properties, Absorption spectrum, Magnetic fields.

The absorption spectrum of Ti(+3) ions has been observed in several crystals of A1203 at low temperatures and 9 Gc/sec. The single resonance line observed as a function of magnetic field strength at a given angle is so asymmetric that an unusual technique was necessary to plot out the line shape; the technique is described. The previous crystal field theory of D. K. Rei is corrected and applied to the 3d1 configuration of Ti(+3). The observed line shape is discussed in terms of variations in local strain at the Ti(+3) site. (Author)

AD-416 243 Div. 25, 4
(TISTM/AMS) OTS price $1.10

Oregon State U., Corvallis.
RADIATION-COLORING OF ALKALI HALIDE CRYSTALS CONTAINING SULFATE IONS,
by Allen B. Scott and B. J. Bosco. 1 Aug 63, 13p.
Contract Nonr128605, Proj. NR018 701
ONR TR5 Unclassified report

Report on A Magnetic Study of Color Centers in Alkali Halides.

Descriptors: (*Potassium compounds, Halides), (*Color centers, Halides), Sulfates, Lens, Single crystals, Crystals, Calcium compounds, Strontium compounds, Colors, Radiation damage, Bromides, Chlorides, X rays, Magnesium compounds, Barium compounds, Alkali metal compounds.

Division 25 - PHYSICS

AD-416 264 Div. 25
(TISTM/REB) OTS price $6.60

General Electric Co., Schenectady, N. Y.
SEMICONDUCTOR DEVICE CONCEPTS.
28 June 63, 65p. Scientific rept. no. 4A
Contract AF19 628 329
AFCRL 63 323 4A Unclassified report

Descriptors: (*Semiconductor devices, Materials), (*Semiconductors, Electroluminescence), Group II elements, Group VI elements, Intermetallic compounds, Cadmium compounds, Sulfides, Copper compounds, Zinc compounds, Copper alloys, Zinc alloys, Selenium alloys, Manufacturing methods, Single crystals.

Injection electroluminescence has been observed in Cu2S-ZnS and Cu2Se-ZnSe heterojunctions. The light emission occurs through hole injection from the p-type Cu chalogenide into n-type ZnS or ZnSe. At room temperature the light emission from the Cu2S-ZnS and the Cu2Se-ZnSe junctions originates at the Cu or self-activated luminescence centers. At 77K edge emission peaking at 2.68 eV has been observed from the Cu2Se-ZnSe diodes with 2V dc applied across the junction. A tentative model for the band structure of the Cu chalcogenide-II-VI compound heterojunctions is presented. Studies on the double acceptor center in CdS have continued with the discovery that these centers can be produced by electron irradiation as well as by Cd firing. Some preliminary conclusions from studies of the diffusion of Cd in CdS are also presented. The junction laser threshold analysis has been extended. Most of the assumptions and approximations previously present have been eliminated. (Author)

AD-416 273 Div. 25
(TISTP/TLG) OTS price $1.60

Harvard U., Cambridge, Mass.
TIME-INDEPENDENT PERTURBATION THEORY BY GAUGE TRANSFORMATIONS,
by Jeremy I. Musher. 4 Apr 63, 24p.
AEC NP12696 Unclassified report

Descriptors: (*Perturbation theory, Transformations (Mathematics)), Partial differential equations.

It is shown that a given solution of a one-electron Schrodinger equation for Hamiltonian (Ho) is also the solution to the Schrodinger equation for a particular gauge-transformed Hamiltonian when any given perturbation is added to Ho. This transformation is obtained from solutions to inhomogeneous partial differential equations similar to those of Dalgarno and Schwartz and it has the virtue of giving the energy expectation value in a particularly simple form. The corresponding many-electron gauge-transformation is also treated, and despite the fact that the equations obtained are in general not exactly soluble, the procedure does provide a useful visualization of the electron correlation contributions to the energy. An approximation for multi-center wave functions, which amounts to choosing a different gauge for each center, is also presented and the error introduced is discussed. (Author)

AD-416 309 Div. 25, 2
(TISTM/EJH) OTS price $10.10

Princeton U., N. J.
THE EFFECT OF VACUUM ON THE SHEARING RESISTANCE OF IDEAL GRANULAR SYSTEMS,
by Gerald D. Sjaastad. June 63, 113p.
Unclassified report

Descriptors: (*Soil mechanics, Moon), (*Friction, Soil mechanics), (*Shear stresses, Soil mechanics), (*Particles, Friction), Atmosphere, Lunar environment, Vacuum apparatus, Laboratory equipment, Glass, Spheres, Low pressure research, Theory, Porosity, Mathematical analysis, Soils.

The frictional behavior of ideal individual particle media was investigated in connection with lunar soil applications. Several conclusions seem justified: (1) The shear strength of an ideal granular system is a function of the atmosphere. Specifically, it is concluded that very low air pressure causes a decrease in thickness of the adsorbed surface films resulting in increased grain to grain friction and shearing resistance. (2) The relationship between interparticle friction and shearing resistance is subject to theoretical analysis that can be reasonably substantiated. (3) It is reasonable to expect that very high vacuum conditions will cause a significant increase in coefficient of friction of some, if not all, rock forming minerals. (4) Size, as such, has no effect on the shear strength of granular materials. (5) At a given absolute density, a uniform material has, in general, a greater shearing resistance than a well graded material. (Author)

AD-416 329 Div. 25
(TISTM/ODN) OTS price $2.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
LINEWIDTH OF NONORIENTED POLYCRYSTALLINE HEXAGONAL FERRITES WITH LARGE MAGNETIC ANISOTROPY FIELDS,
by Isidore Bady and Gilbert McCall. Mar 63, 21p.
Task 3A99 15 006 02
AELRDL TR2350 Unclassified report

Descriptors: (*Ferrites, Magnetic properties), (*Ferromagnetic materials, Ferrites), Anisotropy, Theory, Crystals, Resonance, Equations, Magnetic fields.

Theoretical calculations are made of the linewidth of nonoriented, polycrystalline, hexagonal ferrites with large magnetic anisotropy fields, including both uniaxial and planar ferrites. The nonoriented ferrites are considered to be composed of crystallites whose C axes are radomly oriented over all possible solid angles. For a given biasing field, the solid angle omega is calculated within which the C axis of a crystallite must lie in order that its resonant frequency will differ from the test frequency by a chosen amount. All crystallites within this angle are presumed to absorb energy equally; all other crystallites are presemed not to absorb any energy. The loss term of susceptibility is proportional to omega, and a linewidth can be calculated. It is shown that the linewidth of a nonoriented uniaxial ferrite is considerably wider than the linewidth of a nonoriented planar ferrite. Since imperfect orientation is a major contributor to the linewidth of oriented hexagonal ferrites, it is seen that imperfect orientation will affect the linewidth of uniaxial ferrites far more than that of planar ferrites. This is supported by test data which show that nonoriented planar ferrites can have a linewidth considerably narrower than the narrowest linewidth obtained with oriented uniaxial ferrites. (Author)

AD-416 340 Div. 25
(TISTP/MFA) OTS price $5.60

Northwestern U., Evanston, Ill.
SIXTH ANNUAL AFOSR CONTRACTORS' MEETING ON ION AND PLASMA ACCELERATION -- EVANSTON, ILLIONIS -- MARCH 14-15, 1963 -- ABSTRACTS.
1963, 1v.
AFOSR Report no. 5078 Unclassified report

Descriptors: (*Symposia, Abstracts), (*Plasma physics, Magnetohydrodynamics), (*Ion accelerators, Acceleration), Particle accelerators, Plasma jets, Plasma medium, Shock tubes, Electron density, Propulsion, Thermionic emission, Ionization, Ion beams.

AD-416 346 Div. 25, 9
(TISTP/WH) OTS price $8.60

Harry Diamond Labs., Washington, D. C.
THE STAGNATION-POINT LANGMUIR PROBE IN A SHOCK TUBE--THEORY AND MEASUREMENTS,
by Irvin Pollin. 28 June 63, 89p. Rept. no. TR1103
Proj. 23800
Unclassified report

Descriptors: (*Stagnation point, Boundary layer), (*Boundary layer, Stagnation point), (*Shock tubes, Boundary layer), Electron density, Ions, Density, Measurement, Instrumentation.

A model of the ion-electron flow in the stagnation region between the detached shock and the wall of a Langmuir-type probe is proposed for ionized air in a shock tube at ion mass fractions less than 1/10,000. Based on the close agreement between numerical calculations and measurements of the probe wall ion current density, the proposed model gives an accurate description of the ion-electron flow in the stagnation-point boundary layer when negative potentials are applied at the stagnation point of the probe. The procedure is indicated to be applicable also in the region between the detached probe shock and the edge of the boundary layer. The ion and electron densities in the boundary layer are shown to be strongly dependent on the equilibrium conditions for the high-temperature gas behind the shock. Hence, the ion and electron number densities in the undisturbed incident flow ahead of the detached shock cannot be obtained unless it is possible to calculate the changes in the number densities across the shock. (Author)

AD-416 349 Div. 25
(TISTP/MH) OTS price $2.60

Purdue U., Lafayette, Ind.
GENERAL COVARIANCE AND THE PARTICLE SPECTRUM,
by D. W. Joseph. 1960, 22p.
Contract AF18 600 1579
AFOSR TN60 1239 Unclassified report

Descriptors: (*Particle spectra, Quantum mechanics), Elementary particles, Relativity theory, Curved profiles, Time, Models, Theory, Isotopes, Spin, Mass spectroscopy.

It is postulated that the wave function of a quantum mechanical system be non-trivially covariant under all transformations among some set of coordinate systems appropriate to our curved space-time. It is next shown that this set can probably not be taken to be the curvilinear coordinate systems of general relativity theory. It is then suggested that a ''physically distinguishable'' set of coordinates be determined. This amounts to embedding space-time in a pseudo-Euclidean space of dimension n. An example is presented of a model with n = 8 to illustrate how the increase in the number of components of spinors and the requirement that the wave functions vanish at any appreciable distance from the space-time manifold can lead to a spectrum of elementary particles, with a possible prediction of their masses. (Author)

AD-416 355 Div. 25
(TISTP/JP) OTS price $8.60

Texas A. and M. Coll., College Station.
COMPUTER ANALYSIS OF VIBRONIC BAND ENVELOPES OF ND_3 AND SO_2,
by William Walton Dunn. Aug 63, 91p.
Unclassified report

Doctoral thesis.

Descriptors: (*Electron transitions, Programming (Computers)), Band spectrum, Brillouin zones, Molecular rotation, Excitation, Absorption spectrum, Polarization, Nitrogen compounds, Deuterated compounds, Sulfur compounds, Dioxides, Oxides, Sulfoxides.

A method is described for determining the rotational constants of an excited electronic state and the polarization of the associated transition for symmetric and slightly asymmetric top molecules. This method involves the computation of theoretical intensity envelopes of vibronic bands. The rotational constants of the excited state and the polarization are regarded as parameters which are varied until the resulting computed envelope fits the experimentally observed envelope. (Author)

AD-416 367 Div. 25, 9
(TISTP/FEM) OTS price $4.60

Plastics Lab., Princeton U., N. J.
A GENERAL THEORY FOR THE FLOW OF WEAKLY IONIZED GASES,
by S. H. Lam. Apr 63, 1v. Rept. no. 644
Grant AF AFOSR112 63
AFOSR Rept. no. 4662 Unclassified report

Descriptors: (*Gas ionization, Gas flow), (*Plasma sheath, Electrical conductance), Probes (Electromagnetic), Stagnation point, Geometric form, Charged particles, Reynolds number, Velocity, Electrons, Ions, Absorption, Recombination reactions, Diffusion, Electrostatic fields, Electric potential, Electron density, Electric fields, Cylindrical bodies, Incompressible flow, Equations, Surface properties, Differential equations, Theory.

A general theory is developed for the flow of a weakly ionized gas about arbitrary solid body or bodies with absorbing surfaces. The main interest lies in the prediction of the electrical response on the body surface as a function of the pertinent properties of the flow. The theory is based on continuum formulation, and is valid when (1) the mean-free-path of the charged particles is at most the order of a Debye length and (2) the Debye length is much smaller than the thickness of the boundary layer adjacent to the body surface. The entire range of flow velocity in terms of an electric Reynolds number R is investigated. It is found that the electrical disturbances can be divided distinctly into three physically distinct but mathematically uncoupled regions, namely the outer region, the ambi-polar diffusion region and the sheath region. Closed-

form analytical results are obtained for the floating potential and the current-voltage characteristic. These are useful in the interpretations of Langmuir probbe data. Detailed structures of the solutions are given in terms of explicit unversal functions. (Author)

AD-416 404 Div. 25
(TISTP/JP) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
SCATTERING OF ENERGETIC TRAPPED ELECTRONS BY VERY LOW FREQUENCY WAVES,
by John M. Cornwall. 19 Aug 63, 21p. Rept. no. TDR169 3260 20TN4
Contract AF04 695 169
SSD TDR63 168 Unclassified report

Descriptors: (*Electrons, Resonance scattering), (*Very low frequency, Radio waves), (*Whistlers, Electron transitions), Magnetohydrodynamics, Terrestrial magnetism, Doppler effect, Cosmic rays, Refractive index, Energy conversion, Perturbation theory, Electromagnetic waves, Energy.

The role of VLF waves in precipitating fast electrons is studied. It is found that, by Doppler-shifting whistler frequencies (1-10 kc) up to the local Larmor frequency, a resonant interaction of the type proposed by Dragt and Wentzel (for interaction of protons with hydromagnetic waves) can cause the electrons' mirror points to move randomly. The conditions for resonance lead to a very characteristic dependence on L of the regions of the magnetosphere where VLF waves can effectively precipitate electrons. In general, one expects to see, in a plot of flux vs L, two peaks separated by a broad minimum, the first peak near L approximately equal 1.2. and the second near L approximately equal 2. Such peaks have been seen by several experimenters. In certain regions of space it may be that whistlers can dominate the lifetimes of trapped electrons, especially for L approximately greater then 2. (Author)

AD-416 426 Div. 25
(TISTP/JP) OTS price $1.10

Space Technology Labs. Inc., Los Angeles, Calif.
BOSON EIGENSTATES IN GENERALIZED FIELD THEORY,
by H. C. Corben. 6 Aug 63, 6p.
AEC Rept. no. NP12904 Unclassified report

Descriptors: (*Bosons, Field theory), K mesons, Energy, Spin, Resonance, Operators (Mathematics).

AD-416 440 Div. 25
(TISTM/TCG) OTS price $2.60

Institute for the Study of Metals, U. of Chicago, Ill.
SELF-DIFFUSION OF PALLADIUM IN SILVER-PALLADIUM ALLOYS,
by Richard L. Rowland and Norman H. Nachtrieb. 1962, 21p.
Grant AF AFOSR62 231
AFOSR 51 71 Unclassified report

Descriptors: (*Palladium, Diffusion), (*Silver alloys, Diffusion), (*Palladium alloys, Diffusion), Penetration, Equations of state, Reaction kinetics, Solid solution, Tracer studies, Crystal lattices, Impurities, Energy, Chemical bonds, Theory, Crystal lattice defects.

The self-diffusion coefficient of Pd is reported for 850 and 896 degrees in a series of silver-palladium ranges from 0 to 0.204. For each temperature the data may be represented by an equation of the form D sub Pd = D sub Pd exp(bX), where X is the atom fraction of Pd and b = 7.5. Alternatively, the results conform to the equation D sub Pd = 0.0166exp(-17.21 T sub m T), indicating that a corresponding states law is followed in this nearly ideal system. (Author)

AD-416 444 Div. 25
(TISTP/FEM) OTS price $2.60

Electro-Optical Systems Inc., Pasadena, Calif.
A TWO DIMENSIONAL ''WEAK INTERACTION THEORY'' FOR CROSSED FIELD ACCELERATORS,
BY M. Richard Denison. Apr 63, 17p. Research note no. 12
Contract AF49 638 1063
AFOSR 5173 Unclassified report

Descriptors: (*Accelerometers, Electromagnetic fields), (*Hall effect, Electric fields), Theory, Analysis, Equations, Energy, Momentum, Fluid flow, Plasma sheath, Magnetic fields, Electric potential, Reynolds number, Differential equations, Transformations (Mathematics), Mapping, Temperature, Argon, Helium, Electron density, Electric currents, Electrodes, Numerical analysis.

AD-416 450 Div. 25
(TISTM/ODN) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
INVESTIGATION OF A COMPOUND REPORTED AS BOTH FERRIMAGNETIC AND FERROELECTRIC,
by W. W. Malinofsky and W. J. Skudera, Jr.
Feb 63, 15p.
DA Task 3A99 15 006 02
AELRDL TR2331 Unclassified report

Descriptors: (*Ferrites, Magnetic properties), (*Ferroelectric crystals, X-ray diffraction analysis), Impurities, Ferroelectricity, Ferromagnetism, Crystal structure, Dielectric properties, Microscopy, Barium compounds, Samarium compounds, Niobium compounds, Titanium compounds, Titanates, Photomicrography, Crystal lattices, Data, Oxides.

Shortly after the announcement of the discovery of a new electronic class of compounds with intrinsic ferrimagnetic-ferroelectric behavior, the question arose generally as to the possible presence of an undetected secondary phase as the real source of the magnetic properties. To resolve this question was the major objective of this investigation. To accomplish this, crystallographic, optical, magnetic and dielectric measurements were made as a function of sample composition and firing temperature. The major phase in the series of compounds investigated proved to be only paramagnetic, rather than ferrimagnetic as reported previously by other authors. Direct X-ray diffraction and optical evidence have shown definite ferromagnetic barium ferrite impurity to be present. Several trends in the magnetic properties were observed which indicated that all the so-called ferrimagnetic properties were entirely accounted for by the presence of 1/2%, or less, of this impurity. The ferroelectric properties, on the other hand, appear to be intrinsic for certain x values, although complete saturation may not have been attained in the measurements. Of practical importance is the finding that the dielectric breakdown strength of this material is superior to TiO2 and BaTiO3 at partial cost to other electric properties. (Author)

AD-416 469 Div. 25, 2
(TISTP/MFA) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
DISLOCATIONS IN RUBY LASER CRYSTALS,
by K. Janowski and H. Conrad. 29 July 63, 28p.
Rept. no. TDR169 3240 01TN2
Contract AF04 695 169
SSD TDR63 172 Unclassified report

Descriptors: (*Crystal lattice defects, Symmetry (Crystallography)), (*Lasers, Ruby), Crystal growth, Synthesis, Etched crystals, Material forming, Photomicrography, Polishes, Acids, Potassium compounds, Sulfates.

As part of a program to establish the effect of crystal imperfections on laser output, a detailed study was made of the dislocation structure of ruby crystals obtained from various sources. Using $KHSO_4$ as an etchant, a detailed mapping of the dislocation structure on the (0001) and the (11 bar 20) planes was performed. A less extensive study was made of the rhombohedral planes. The average dislocation density on the basal plane was 1.5 to 3 x 1,000,000/cm sq and on the (11 bar 20) planes it was approximately 5 x 100,000/cm sq. However, considerable variation existed between areas on a given plane. The subbondaries in the basal plane tended to lie along 1 bar 100 type directions while those on the (11 bar 20) plane tended to lie: (a) parallel to the basal plane, (b) along traces of the (1 bar 101) plane, and (c) along normals to the traces of the (0001) planes. These orientations suggest that many of the dislocations lie on the (0001), 1 bar 101 and 11 bar 20 planes. A Laue back-reflection analysis of c-axis wander in one crystal revealed a gradual increases in misorientation from one end of the crystal to the other, with a maximum variation of one degree 35 minutes. Slight etching of a mechanically polished crystal revealed numerous polishing scratches, suggesting the existence of a plastic flow layer. (Author)

AD-416 487 Div. 25
(TISTM/BRW) OTS price $.50

Columbia U., New York.
THE EFFECT OF RANDOM LOADING ON CREEP DEFORMATION IN A NON-LINEAR METAL.
Rept. for Dec 62-Mar 63,
by Maciej P. Bieniek. July 63, 13p.
Contract AF33 657 11152, Proj. 7351, Task 735106
ASD TDR63 646 Unclassified report

Descriptors: (*Metals, Creep), (*Creep, Numerical analysis), Deformation, Strain (Mechanics), Stresses, Loading (Mechanics), Aluminum alloys, Programming languages.

This report deals with a numerical analysis of the creep deformation in non-linear metals under random loading. The results of these calculations show that for a non-linear material a constant mean stress cannot be used as an equivalent of a random stress sequence. The creep deformation strongly depends on the type of distribution and the variance of a random stress, and it is always larger than that obtained for the constant mean value of stress. (Author)

AD-416 497 Div. 25
(TISTP/FR) OTS price $14.00

Munich U., (Germany).
INVESTIGATION OF THE INFRARED EMISSION SPECTRUM OF THE ATMOSPHERE AND EARTH,
by Hans-Jurgen Bolle, Fritz Moller, and Wilford Zdunkowski. May 63, 191p. Technical rept. no. 2
Contract AF61 052 488
AFCRL 63 680 Unclassified report

Descriptors: (*Spectra (Infrared), Measurement), Infrared radiation, Water vapor, Line spectrum, Doppler effect, Wave transmission, Absorption, Atmosphere, Earth.

The separation of line and continuum emission in the 8 - 26 micron sky emission spectrum and its calculation by means of radiation diagrams is discussed for narrow spectral intervals containing no, one, or two water vapor rotational lines. Continuum absorption coefficients and the intergrated absorptions of four lines are determined by comparison of calculated and measured radiance values. A radiation diagram for the 8.75 - 12.25 micron window region is presented and compared with measurements. (Author)

26. PRODUCTION AND MANAGEMENT

AD-415 651 Div. 26
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ANODIC-MECHANICAL NOTCHING MACHINE MODEL ME-4,
by Yu. V. Astakhov. 15 Apr 63, 3p.
FTD TT63 153 Unclassified report

Trans. from Byulleten' Tekhniko-Ekonomicheskoy Informatsii, No. 11, pp. 42-44, 1961.

Descriptors: (*Machine tools, Electroerosive machining), (*Stainless steel, Machining), Sheets, Anodes, Industrial equipment, Design.

AD-415 653 Div. 26, 14
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN QUESTIONS RELATING TO THE THEORY OF THE WELDING OF PLASTICS BY ULTRASOUND,
by L. N. Skorokhodov. 29 Apr 63, 10p.
FTD TT63 359 Unclassified report

Trans. from Plasticheskiye Massy, No. 11, pp. 33-35, 1962.

Descriptors: (*Plastics, Welding), (*Welding, Ultrasonic radiation), Magnetostriction, Acoustics, Vibration, Compressive properties, Waveguided, Stresses, Polyvinyl chloride, Polyamide plastics, Industrial equipment.

AD-415 654 Div. 26, 20, 4
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIATION-THERMAL CRACKING OF HYDROCARBONS,
by A. V. Topchiyev, L. S. Polak, N. Ya. Chernyak, V. Ye. Glushnev and P. Ya. Glazunov. 10 Apr 63, 11p.
FTD TT62 1930 Unclassified report

Trans. from Radiosktivnyye isotopy i yadernyye izlucheniya v narodnom khozyaystve SSSR, Riga, pp. 206-210, 1960.

Descriptors: (*Organic compounds, Processing), (*Radiation chemistry, Processing), (*Production, Hydrocarbons, Gamma rays, Indium alloys, Gallium Alloys, Powders, Radioactive isotopes, Hydrogen, Alkanes, Temperature.

AD-415 725 Div. 26, 11
(TISTE/OHD) OTS price $5.60

Oklahoma U., Norman.
THE EFFECT OF FLOW RATE ON EFFICIENCIES OF COMMERCIAL OIL FILTERS,
by John Sheridan McDonald. 1963, 46p.
Unclassified report

Master's thesis.

Descriptors: (*Oil filters, Fluid flow), Effectiveness, Velocity, Contamination, Lubricants, Oils.

The purpose of this investigation was to compare the results of flow rate on efficiency of a commercial filter with the results of Hamilton's investigation and Ewbank's proposed equation. Since the efficiency of a filter was determined to be a function of viscosity, operating temperature, flow rate, and amount of contaminant accumulated in the filter the first two variables were held constant over each run but was varied between runs. Since the amount of contaminant accumulated in the filter changes continuously during the tests, the data obtained was cross plotted to get a reading of efficiencies at constant dirt loading for each particular flow rate. (Author)

AD-416 129 Div. 26, 8
(TISTP/FEM) OTS price $8.10

Santa Barbara Research Center, Goleta, Calif.
PRODUCTION ENGINEERING MEASURE - PbSe INFRARED DETECTORS - TYPE IR-200.
Quarterly progress rept. no. 2, 1 Apr-1 July 63, by G. H. Cook. 4 Sep 63, 1v. Rept. no. TP6365A
Contract DA36 039AMC01466 K
Unclassified report

Descriptors: (*Manufacturing methods, Infrared equipment), (*Production, Glass), Quality control, Mechanical drawings, Infrared detectors, Specifications.

Work accomplished is as follows: Production control procedures have been written for an inventory control system and work order system. A preliminary Bill of Materials has been prepared. A Flow Chart has been made to describe the sequence of operations. Manufacturing procedures have been written for those processes not defined by engineering specifications. A preliminary Quality Control Plan has been drafted and preliminary inspection procedures have been written. Design of special tooling has been started. Test equipment design parameters have been finalized. The first three (3) engineering samples have been delivered. Revisions have been made to the engineering drawings, reflecting the change from the silicon window to the sapphire window. (Author)

AD-416 130 Div. 26
(TISTE/CAM) OTS price $5.60

Republic Aviation Corp., Farmingdale, N. Y.
RESEARCH INVESTIGATION OF HYDRAULIC PULSATION CONCEPTS.
Quarterly progress rept. no. 2, 1 June-31 Aug 63. 31 Aug 63, 47p. Rept. no. RAC933 2
Contract AF33 657 10622, Proj. 8128, Task 812807
Unclassified report

Descriptors: (*Hydraulic systems, Hydraulic models), (*Rectifiers, Hydraulic models); (*Transformers, Hydraulic models), (*Hydraulic accumulators, Hydraulic systems), (*Hydraulic servomechanisms, Hydraulic models), (*Hydraulic actuators, Hydraulic systems), Pulse generators, Miniature electrical equipment, Transmission lines, Wiring diagrams, Electric motors, Hydraulic valves.

Research is presented on hydraulic pulsation concepts. The relative efficiency of one, two, and three line systems was studied. Layout design of an alternator valve and a synchronous pulsating motor were completed, and a transformer/fluid level compensating unit started. Characteristic equations and electrical equivalents of a typical system were completed. A miniaturized pulsating system is in operation and data are being derived from it. (Author)

AD-416 158 Div. 26
(TISTE/OHD) OTS price $6.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 13, 1 Apr-31 May 62, by James L. Hnang. 31 May 62, 1v. AL62L023
Contract NObs78552

Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Measurement, Vibration), Roller bearings, Shafts, Capacitance, Instrumentation, Measuring devices (Electrical and electronic), Motion, Frequency.

A method of measuring shaft vibrations of the large bearings vibration tester by a capacitance gage is described. Measurements of shaft vibrations are discussed. The repeatability of octave band vibration measurement of 23256 spherical roller bearings is analyzed. The relationship between bearing vibration level measured in octave bands and the rotational speed of spherical roller bearings has been studied. (Author)

AD-416 159 Div. 26
(TISTE/OHD) OTS price $5.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 11, 1 Dec 61-31 Jan 62, by James L. Huang. 31 Jan 62, 50p. AL62L011
Contract NObs78552

Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Test methods, Bearings), Test equipment, Ball bearings, Laminates, Vibration isolators.

Angular and axial vibration spectra of ball bearings have been studied for comparison with theory presented in Special Report AL62L005. Tests with laminated beams, as vibration attenuating bearing mounts, are reported. Test results on the vibration tester for large bearings are discussed. (Author)

AD-416 160 Div. 26
(TISTE/OHD) OTS price $5.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 14, 1 June-31 July 62, by James L. Huang. 31 July 62, 57p. AL62L032
Contract NObs78552

Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Roller bearings, Frequency analyzers), Frequency, Narrowband, Broadband, Loading (Mechanics), Experimental data, Tests.

Resonant frequencies were determined from the narrow band spectra of a 23256 spherical roller bearing run at five different speeds. The narrow band spectrum of a 23256 spherical roller bearing was studied. Theoretically predicted vibration peaks, due to various orders of waviness, were verified. The effect of radial looseness of a 23256 spherical roller bearing on the narrow band spectrum and octave or wide band readings was studied. The effect of axial load on the octave band vibration level of 23256 spherical roller bearings was investigated in the range above 50 cps. (Author)

AD-416 162 Div. 26
(TISTE/OHD) OTS price $8.10

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 17, 1 Dec 62-31 Jan 63, by R. J. Finkelston, J. I. McCool, R. A. Hoffman and J. L. Huang. 31 Jan 63, 80p. Rept. no. A163L015
Contract NObs78552

Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Roller bearings, Tests), Deformation, Measurement, Experimental data, Noise, Rings, Analysis.

The vibration characteristics of a 96900/96140 tapered roller bearing were studied. Improved tapered roller bearings of 9 in. bore were tested for comparison with the standard quality 96900/96140 bearing. The effect of waviness on the bearing vibration level was studied analytically by calculating theoretical amplification factors and improvements of the waviness of an improved 96900/96140 bearing are evaluated with reference to the theoretical and experimental reductions in vibration level. Vibration levels of spherical, cylindrical and tapered roller bearings (with 200 mm bore) are compared. The airborne noise of standard quality spherical, cylindrical and tapered roller bearings was measured and the airborne noise characteristics of the bearings are discussed. A theoretical and experimental resonance study of large roller bearings has been made. Peaks due to a rigid body mode of vibration and some lower flexural modes of the bearing outer ring are identified. An analytical approximation to the amplitude of the flexural outer ring vibration generated by inner ring two point out of roundness is presented. (Author)

AD-416 169 Div. 26
(TISTE/OHD) OTS price $5.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 7, 1 Apr-31 May 61, by Ulrich Rimrott and Olof Gustafsson. 31 May 61, 1v. Rept. no. AL61L024
Contract NObs78552, Proj. NE071 200

Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Ball bearings, Analysis), Frequency, Theory, Frequency analyzers, Narrowband, Loading (Mechanics), Test methods, Experimental data.

A discussion is given of the vibrations induced by the variable compliance of a radially loaded bearing and of vibrations from other sources operating at the ball passage frequency. Narrow band low frequency vibration spectra (up to 200 cps) are shown and interpreted with emphasis on discrete frequencies that can be explained by bearing kinematics. A detailed experimental investigation was conducted of the amplitudes occurring under various loads at the ball passage frequency and its second harmonic. It is shown

that the results are in excess of the amplitudes predicted theoretically at these frequencies. A discussion is presented regarding the relative importance of several causes of low frequency vibration. Tests are reported on the effect of fit between bearing O.D. and housing on the vibrations observed at the housing O.D. (Author)

AD-416 170 Div. 26
(TISTE/OHD) OTS price $3.60

SKF Industries, Inc., Philadelphia, Pa.
A STUDY OF ELASTIC VIBRATIONS OF THE OUTER RACE OF A ROLLING ELEMENT BEARING.
Special rept.,
by Ronald L. Huston. 29 Aug 61, 1v. Rept. no. AL61L027
Contract NObs78552, Proj. NE071 200
Unclassified report

Report on study of the vibration characteristics of bearings.

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Rings, Bearings), Elasticity, Frequency, Frequency analyzers, Ball bearings, Mathematical analysis, Differential equations, Partial differential equations.

Elastic flexural vibrations of a thin ring (the outer race of a ball bearing) are investigated analytically using mathematical principles common in the theory of mechanical vibrations. The analysis is performed by first deriving a governing differential equation. Exact and approximate solutions of this equation are then presented for various geometrical configurations such as a free circular ring, a circular ring on a linear radial elastic foundation, a circular ring rigidly supported at a number of equally spaced points, and a circular ring supported by a number of equally spaced identical linear springs (simulating the conditions in a bearing). A brief discussion of forced vibrations is also included. Finally, a numerical example is outlined for the 6312 deep groove ball bearing. (Author)

AD-416 171 Div. 26
(TISTE/OHD) OTS price $6.60

SKF Industries, Inc., Philadelphia, Pa.
ANALYTICAL STUDY OF THE VIBRATION OF A BEARING WITH FLEXURALLY RIGID RACES.
Special rept.,
by Olof Gustafsson. 3 Oct 61, 1v. Rept. no. AL61L032
Contract NObs78552, Proj. NE071 200
Unclassified report

Report on Study of the Vibration Characteristics of Bearings.

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Ball bearings, Rings), Stability, Deformation, Distortion, Frequency, Harmonic analysis, Mathematical analysis.

An analytical study of the vibrations induced by geometrical irregularities (waviness in the race grooves and balls and ball diameter variations) in an axially loaded ball bearing is presented. It is assumed that both races are flexurally rigid and deform elastically only at the contacts between balls and races. Ball mass is taken to be negligible, and zero damping is assumed. To simplify the mathematics a linear approximation of the elastic deformation at the contacts is first used. Effects of certain types of non-linearity are then examined. Only the radial vibrations of the outer ring are treated in this analysis. (Author)

AD-416 172 Div. 26, 30
(TISTE/OHD) OTS price $1.10

SKF Industries, Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Progress rept. no. 9 for period ending Feb 61, by Roye C. Munsell, Edwin Fink, and Olof Gustafsson. Feb 61, 3p. Rept. no. AL61L012
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Vibration, Measuring devices (Electrical and electronic)), (*Bearings, Vibration), (*Instrumentation, Vibration), Calibration, Axle shafts, Experimental data.

It was mentioned in previous progress reports that to obtain repeatable readings on several Anderometers, not only must the electronic systems and pickups be accurately calibrated, but the mechanical elements of the Anderometers must also function repeatably. No standard procedure was, however, established for measuring the spindle influence on the bearing vibration reading or for eliminating differences between various spindle assemblies. Work is now being done to develop such procedures. Preliminary findings are reported herein. (Author)

AD-416 173 Div. 26
(TISTE/OHD) OTS price $9.60

SKF Industries, Inc., Philadelphia, Pa.
ANALYTICAL STUDY OF THE RADIAL, AXIAL AND ANGULAR VIBRATION OF A BEARING WITH FLEXURALLY RIGID RACES.
Special rept.,
by Olaf Gustafson. 3 Apr 62, 1v. Rept. no. AL62L005
Contract NObs78552, Proj. NE071 200
Unclassified report

Report on Study of the Vibration Characteristics of Bearings.

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Rings, Bearings), Motion, Stability, Ball bearings, Linear systems, Mathematical analysis, Deformation, Frequency.

SKF report AL61L032 describes the radial vibration of the outer ring of an axially loaded ball bearing rotating at a constant speed. The axial and angular motion of the outer ring were not considered. In the present report, a more complete study of the motion of the outer ring is made. The vibration of the outer ring in the radial and axial direction, as well as the angular vibration (wobble) is studied. (Angular motion is experimentally and analytically distinguishable from axial motion.) The outer ring is considered flexurally rigid, supported by the balls and by a radially and angularly elastic housing. Axially, the housing applies a constant force. As in the previous study, the ball mass is taken to be negligible, zero damping is assumed and the elastic deformation at the ball contacts, as well as the radial and angular deformations of the housing are assumed to be linear in the amplitude range considered. (Author)

AD-416 174 Div. 26
(TISTE/OHD) OTS price $5.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.

Progress repts. no. 9 and 10, 31 Aug-30 Nov 61, by James L. Huang. 30 Nov 61, 1v. Rept. no. AL61L038
Contract NObs78552, Proj. NE071 200
Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Experimental data, Bearings), Deformation, Distortion, Ball bearings, Vibration isolators, Attenuation, Damping, Frequency analyzers, Frequency.

The effect of waviness, measured in a broad band, on the bearing vibration is discussed on the basis of SKF experimental data. The effect of the number of balls on the radial bearing vibration, as measured in octave bands, is shown experimentally and a comparison with theory made. Tests with vibration attenuating bearing mounts are reported. Radial vibration spectra of bearings have been studied for comparison with theory presented in Special Report AL61L032. A method for evaluating the damping from the vibration spectrum of a bearing is presented. Trial runs on the vibration tester for large bearings are reported. (Author)

AD-416 175 Div. 26, 30
(TISTE/OHD) OTS price $1.60

SKF Industries Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Progress rept. no. 4 for period ending 30 Sep 60, by Edwin Fink and Olof Gustafsson. 30 Sep 60, 16p. Rept. no. L60L024
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Vibration, Measuring devices (Electrical and electronic)), (*Bearings, Vibration), (*Instrumentation, Vibration), Test equipment, Frequency, Calibration, Transducers.

This report contains a review and recommendations on the following subjects: (1) Study of characteristics of Anderometer pickup and of a more suitable pickup. (2) New loading device for Anderometers. (3) Study of the effect of the spindle assembly on bearing vibration readings. (Author)

AD-416 176 Div. 26
(TISTE/OHD) OTS price $8.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 15, 1 Aug 62-30 Sep 62, by R. J. Finkelston, J. Huang and R. A. Hoffman. 30 Sep 62, 1v. Rept. no. AL63L004
Contract NObs78552, Proj. NE071200
Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Scientific research, Bearings), Roller bearings, Narrowband, Frequency, Frequency analyzers, Misalignment, Analysis, Experimental data.

The narrow band vibration spectrum of NJ256K cylindrical roller bearing was studied. Peaks induced by roller waviness were identified experimentally. The effect of radial load and rotational speed on the vibration level of the NJ256 cylindrical roller bearings was studied. The vibration characteristics of a 23240 spherical roller bearing were studied and the results were compared with those of the 23256 spherical roller bearings tested previously. 23240 spherical roller bearings with improved bearing components were tested. The effect of waviness of each bearing part on the vibration level of the assembled bearing was analyzed and the relative improvements of each part are discussed with respect to the reduction achieved in the vibration level. (Author)

AD-416 177 Div. 26
(TISTE/OHD) OTS price $1.60

SKF Industries, Inc., Philadelphia, Pa.
FLEXURAL VIBRATIONS OF A BALL BEARING OUTER RING DUE TO BALL LOADS.
Special rept.,
by John I. McCool. 6 Dec 61, 19p. Rept. no. AL61L037
Contract NObs78552, Proj. NE071 200
Unclassified report

Report on Study of the Vibration Characteristics of Bearings.

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Ball bearings, Loading (Mechanics)), Distortion, Misalignment, Flexible shafts, Frequency, Deflection, Fourier analysis, Theory.

Geometrical imperfections of the rolling surfaces of a rolling element bearing are usually considered the main source of bearing vibration. There are, however, certain types of vibration that are generated, even in a geometrically perfect bearing. One of these is the elastic compliance vibration in a radially loaded bearing. Another type of vibration which occurs even in a purely axially loaded geometrically perfect bearing is induced by the flexibility of the outer ring. This type of vibration is analyzed in this report. The radial deflection of a thin ring due to bending by equally spaced, equal radial loads is found as a function of the angular coordinate of the ring. By expressing the angular coordinate as a function of time, the wave form of the displacement of a point on the stationary outer ring of a rotating bearing is found. An expression for the RMS level of any harmonic of the vibrational velocity is found by termwise differentiation of the Fourier expansion of the displacement function. As a numerical example the RMS amplitudes are computed for an single row deep groove ball bearing. (Author)

AD-416 178 Div. 26
(TISTE/OHD) OTS price $2.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 5, 1 Dec-31 Jan 61, by Ulrich Rimrott and Olof Gustafsson. 31 Jan 61, 24p.
Contract NObs78552, Proj. NE071 200
Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Noise, Bearings), Ball bearings, Frequency, Measurement.

The airborne noise level in every octave band above 200 cps increases with the rotational speed. No conclusions can be drawn about the 50-100 cps and 100-200 cps bands, since the background noise in the anechoic chamber without the tester running, is of the same order of magnitude as the noise level with the tester running. It appears that the curve representing the relationship between airborne noise and speed in each band above 200 cps is very similar to the vibration/speed curves, i.e. a good correlation between airborne noise level and vibration level

appears to exist. The spectral distribution of the airborne noise in the 200-12800 cps range shows, with a few minor exceptions, the same characteristic pattern for all four speeds used: low readings in the 200-400 cps band, about 4-6 db higher in the bands between 400-6400 cps, and a drop of about 6 or 10 db in the 6400-12800 cps band. This spectral distribution is not the same as for the vibration measurements, where the tendency is for the level to decrease rapidly with the frequency. The effect of the magnitude of the radial load (in the 25-250 lbs. range) on the airborne noise level appears to be rather small, although somewhat greater than for the vibration measurements. The variation between airborne noise levels for different loads are in most cases within 6 db and in a few measurements as high as 10 or 11 db. (Author)

AD-416 182 Div. 26
(TISTE/OHD) OTS price $5.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 16, 1 Oct-30 Nov 62,
by Robert J. Finkelston and James L. Huang.
30 Nov 62, 49p.
Contract NObs 78552, Proj. NE071 200
Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Test methods, Bearings), Experimental data, Roller bearings, Ball bearings, Deformation, Analysis.

The vibration characteristics of a NJ240 cylindrical roller bearing were studied and a comparison of these characteristics with those of the NJ256 bearings is made. An improved NJ240 cylindrical roller bearing was vibration tested and the effect of waviness on the vibration level of the bearing was studied analytically in a manner similar to that of the improved spherical roller bearings. The vibration of ball bearings of basic 6305 size with special design features and components of low waviness was studied and comparisons are made with bearings of various sizes having good vibrational quality. (Author)

AD-416 183 Div. 26, 30
(TISTE/OHD) OTS price $3.60

SKF Industries, Inc., Philadelphia, Pa.
LOW AMPLITUDE CALIBRATION OF THE ELECTRICAL SYSTEM AND OF THE PICKUP.
Special rept.,
by E. W. Fink and Olof Gustafsson. 10 Jan 61,
1v. Rept. no. L61L001
Contract NObs78593, Proj. CR01
Unclassified report

Report on Calibration of Anderometers.

Descriptors: (*Instrumentation, Vibration), (*Calibration, Measuring devices (Electrical and electronic)), (*Bearings, Vibration), Transducers, Test equipment, Amplifiers, Frequency, Mathematical analysis, Band-pass filters.

A method for low amplitude calibration of the electrical system including the pickup of velocity reading bearing vibration testers is presented. Requirements to be fulfilled by vibration test equipment in order to permit calibration, are listed. Calibration arrangements are described, as built, tested and currently used by SKF. (Author)

AD-416 184 Div. 26
(TISTE/OHD) OTS price $2.60

SKF Industries Inc., Philadelphia, Pa.
HARMONIC ANALYSIS OF THE RELATIVE AXIS MOTION INDUCED BY VARIABLE ELASTIC COMPLIANCE IN BALL BEARINGS.
Special rept.,
by Olof Gustafsson. 13 Mar 61, 23p. Rept. no. AL61L009
Contract NObs78552, Proj. NE071 200
Unclassified report

Report on study of the vibration characteristics of bearings.

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Harmonic analysis, Ball bearings), Motion, Elasticity, Rings, Frequency, Loading (Mechanics), Mathematical analysis.

The relative motion of the rings of a radially loaded, zero contact angle, ball bearing, induced by the variable elastic compliance of the bearing, was studied in SKF report L60L023. A method was described for determining the wave forms of the displacement in the direction of, and perpendicular to the external radial load, for any radial load and positive radial looseness. It was shown that the variable elastic compliance motion does not follow a sine curve. In addition to vibrations in the fundamental frequency, corresponding to the frequency of ball passage, harmonics of higher order are present. This report presents a method to determine the amplitudes of the harmonics of velocity components of the variable compliance motion in radially loaded, zero contact angle, ball bearings in the direction of, and perpendicular to the external radial load. The method is based on harmonic analysis of the waveform computed according to Report L60L023. The method was applied to a bearing with seven balls. Curves showing the amplitudes of the nine first harmonics are presented for this case. An extension of the method to other ball complements requires some further programming and computer work, but is otherwise straight-forward. (Author)

AD-416 185 Div. 26
(TISTE/OHD) OTS price $3.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 12, 1 Feb-31 Mar 62,
by James L. Huang. 31 Mar 62, 1v. Rept. no. AL62L013
Contract NObs78552, Proj. NE071 200
Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Measurement, Vibration), Roller bearings, Frequency analyzers, Test methods, Experimental data, Frequency, Loading (Mechanics).

Narrow band spectra of spherical roller bearings tested on the large vibration tester are given. The effect of radial load on the octave band vibration level of large spherical roller bearings is discussed. (Author)

AD-416 190 Div. 26
(TISTE/OHD) OTS price $.75

Watervliet Arsenal, N. Y.
AN AUTOMATIC GRINDER FOR PRODUCING HELICAL-GROUND

FORM-RELIEVED RIFLING BROACHES,
by A. W. Miller and R. H. Cipperly. July 63, 26p.
WVT Rept. no. 11 6310 Unclassified report

Descriptors: (*Grinders, Broaches), (*Broaches, Rifling), Helixes, Production.

A grinding attachment has been developed and adapted to a standard thread grinder, making the machine capable of automatically producing helical-ground, form-relieved, rifling broaches. Included are the requirements leading to the selection of a specific machine and the concept of this attachment. Also included are detailed explanations, with sketches, of the various parts and operations of this machine along with recommendations for improvements in subsequent machines. The report shows the acceptability of broaches produced on this machine and possible savings to be realized by lowered requirements for operator skill and reduction in machining time and in broach maintenance. (Author)

AD-416 228 Div. 26
(TISTE/OHD) OTS price $4.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 8, 1 June-31 July 61,
by Ulrich Rimrott and Olof Gustafsson. 31 July 61, 1v. Rept. no. AL61L031
Contract NObs78552, Proj. NR071 200
Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), (*Tests, Bearings), Loading (Mechanics), Frequency, Frequency analyzers, Roller bearings, Ball bearings, Deformation, Narrowband, Experimental data.

The effect of the number of rolling elements on the radial vibration spectrum expressed in octave bands is shown experimentally. Vibrations of 6305 bearings in axial direction were studied at various loads and speeds. Radial vibration spectra of 6322, 6312, 6305 and 6203 bearings were recorded for determination of outer ring resonances; comparison to theory described in Special Report AL61L027 is made. Narrow band spectra were taken showing the fine structure of a 6305 and 6312 bearing vibration spectrum. The status of procurement of bearings with improved smooth running characteristics (both large roller bearings and small ''Amendment 3'' bearings) is reported. Waviness measurements on large roller bearing races are reported and a newly installed vertical wavometer is described. Some experiences gained during trial runs of the newly installed large bearing vibration tester are reported. (Author)

AD-416 324 Div. 26, 17, 1
(TISTA/VGW) OTS price $31.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ORGANIZATION AND PLANNING OF AN AIRCRAFT CONSTRUCTION ENTERPRISE (ORGANIZATSIYA I PLANIROVANIYE SAMOLETOSTROITEL'NOGO PREDPRIYATIYA),
by V. I. Tikhomirov. Sep 58, 611p.
FTD F TS9503/V Unclassified report

Descriptors: (*Aircraft industry, Handbooks), Industrial plants, Industrial production, Industrial equipment, Industrial procurement, Management engineering, Production, Wages, Economics, Logistics, Quality control, Storage, Transportation, Costs.

A systematic exposition is presented of the organization and planning of an aircraft construction enterprise: the forms and methods of the organization of production, the productive and organizational structure of the enterprise, the administration of the enterprise, the organization, standardization and payment of labor, the technical preparation and servicing of production, and the internal planning in the plant. This book also includes a number of standards, so that it may be used as a handbook in practical work. (Author)

27. PROPULSION SYSTEMS

AD-415 640 Div. 27, 10
(TISTE/JWS) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMBUSTION AND CARBURETION IN DIESEL ENGINES (SELECTED ARTICLES).
21 Mar 60, 51p.
FTD TT63 31 Unclassified report

Trans. from Sgoraniye i Smeseobrazovaniye v Dizelyakh, Trudy Nauchno-Teknicheskoy Konferentsii, Provedennoy v Iyune, 1958 g. Laboratoriyey Dvigateley Akademii Nauk SSSR, Moscow, pp. 37-52, 156-171, 1960.

Descriptors: (*Diesel engines, Combustion), (*Fuels, Diesel engines), Autoignition, Fuel additives, Compressive properties, Ignition, Shock waves, High temperature research.

An investigation of the ignition of homogeneous fuel-air mixtures by compression and by a hot surface. An investigation of carburetion in engines with divided turbulent combustion chambers. (Author)

AD-415 650 Div. 27, 9
(TISTE/CAM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE QUESTION OF DAMPING THE AERODYNAMIC FORCE IN VANE VIBRATION,
by H. Hiller. 11 Apr 63, 18p.
FTD TT63 288 Unclassified report

Trans. from Maschinenbautechnik, Nr. 10, pp. 536-541, Oct 1962.

Descriptors: (*Gas turbine blades, Vibration), (*Aerodynamic loading, Damping), Motion, Measurement, Theory.

AD-415 668 Div. 27, 12, 7
(TISTE/OHD) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE PROBLEM OF ELECTRON JET ENGINES AND THE DIRECT CONVERSION OF HEAT ENERGY INTO ELECTRIC (FROM DATA IN THE FOREIGN PRESS),
by A. Ye. Kaplyanskiy. 4 Apr 63, 21p.
FTD TT63 298 Unclassified report

Trans. from Elektrichestvo, no. 11, pp. 7-13, 1961.

Descriptors: (*Electric propulsion, Electric power production), (*Rocket motors, Electron beams), (*Energy conversion, Generators), Heat, Space flight, Plasma jets, Ion engines.

AD-415 860 Div. 27
(TISTA/FRL) OTS price $7.60

Hiller Aircraft Corp., Palo Alto, Calif.
INVESTIGATION OF THE PROCESS OF ENERGY TRANSFER FROM AN INTERMITTENT JET TO SECONDARY FLUID IN AN EJECTOR-TYPE THRUST AUGMENTER.
Interim summary rept., 1 Apr 61-30 June 62,
by Raymond M. Lockwood. 30 June 62, 1v. ARD305
Contract Nonr308200
Unclassified report

Descriptors: (*Thrust augmentor nozzles, Experimental data), Analysis, Numerical analysis, Tests, Schlieren photography, Non-linear differential equations, Jets, One-dimensional flow, Vector analysis, Turbo jet engines, Pressure, Scientific research, Pulse jet engines.

The current phase of the thrust augmentation investigation is reported. Showing a correlation between analysis and test data. Improved experimental techniques were used, including color schlieren streak photography and high speed pressure transducer records. Two analyses have been made, each being a graphical-numerical solution to the non-linear partial differential equations of unsteady one-dimensional gas dynamics. The first is the detailed ''in the small'' use of wave diagrams in the physical (x-t) plane in conjection with the classical numerical method of calculations called Method of Characteristics. The second is the newer ''Vector-Polar Method'' which deals with wave and fluid velocity interactions only in the large. The latter is based on a combination of two plots, (1) the (x-t) physical plane and (2) the vector plot of the natural logarithm of pressure ratios across each major compression fan, shock wave, and rarefraction fan versus the change of particle velocity ratio. The device for converting steady flow to intermittent jets has been used in conjunction with color schlieren and high-speed pressure instrumentation and is shown to be an excellent research tool for creating intermittent jets with a range of velocities and wave forms not possible heretofore. This device also appears to have potential as a high-performance thrust augmenter for turbojet lift engines. (Author)

AD-416 014 Div. 27
(TISTA/FRL) OTS price $3.60

Rocketdyne, Canoga Park, Calif.
SUMMARY OF EXPERIMENTAL ION ROCKET PROGRAM.
Report for 1 May 58-30 Apr 59,
by A. T. Forrester and R. C. Speiser. May 59, 28p.
Rept. no. R1763
Contract AF49 638 351, Proj. 3750
AFOSR TN59 878 Unclassified report

Descriptors: (*Ion engines, Electric propulsion), Experimental data, Ionization potentials, Theory, Analysis, Test equipment, Acceleration, Oscillation, Thrust, Vacuum.

The purpose of this program is to gain an understanding of basic electrical propulsion principles, propellant properties, and ionization and acceleration techniques. Experimental studies were performed on contact ionization ion sources, ion acceleration, and ion beam neutralization. Small research-type devices were successfully operated in ion motor configurations to verify theoretical analysis and to integrate experimental tests on components. The report discusses two types of vacuum systems: a bell jar, and a small steel tank. The tank operation proved more versatile, and two working variations of the device were built and tested. Instrumentation, fabrication, and neutralization techniques are described, and future work is outlined. (Author)

AD-416 365 Div. 27, 10
(TISTM/REB) OTS price $5.60

Jet Propulsion Center, Purdue U., Lafayette, Ind.
SUMMARY OF EXPERIMENTAL INVESTIGATIONS OF COMBUSTION PRESSURE OSCILLATIONS IN GASEOUS PROPELLANT ROCKET MOTORS.
Final rept.,
by M. J. Zucrow, J. R. Osborn, and J. M. Bonnell.
June 63, 43p. Rept. no. F63 2
Contract AF49 638 756
AFOSR 5261 Unclassified report

Descriptors: (*Rocket motors, Gaseous rocket propellants), (*Gaseous rocket propellants, Combustion), (*Combustion, Stability), Pressure, Combustion chamber gases, Cylindrical bodies, Engine structures, Combustion chambers, Design, Fuel injection, Mixtures.

The experiments conducted were designed for studying the factors promoting combustion pressure oscillations in rocket motors burning either premixed or unmixed gaseous propellants. Investigations were conducted for determining the effects of combustion chamber geometry, the chemical differences in the propellants, and also the effects of several injection variables. Auxiliary studies were conducted regarding the effects of baffles located in the combustion chambers, and the applicability of linear theories to combustion instability phenomena. (Author)

AD-416 446 Div. 27
(TISTA/FRL) OTS price $1.60

IIT Research Inst., Chicago, Ill.
DEVELOPMENT AND APPLICATION OF A THEORY FOR PLASTIC DEFORMATION OF CEMENTED ALLOYS.
Quarterly rept., 1 Jan-31 Mar 63,
by N. M. Parikh. 30 Apr 63, 15p.
Contract DA11 022 505ORD3902, Proj. TB4 002; 5B93 32 002
WAL TR372 32 8T3 Unclassified report

Report on Rocket Nozzle Materials.

Descriptors: (*Rocket motor nozzles, Refractory metals and alloys), (*Refractory metals and alloys, Processing), Deformation, Tungsten alloys, Silver alloys, Sintering, Plating, Molybdenum, Powder metallurgy.

Reported are the experiments related to process development for fabrication of tungsten-silver rocket nozzle materials. The simple techniques of plating tungsten powders, sintering, and infiltrating with silver yields materials with properties and microstructures identical to the commercial materials. A simpler one-step process involving liquid-phase sintering of cold pressed powders also yields a similar product. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-415 676 Div. 28, 16
(TISTM/TLG) OTS price $12.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BIOLOGICAL RADIO COMMUNICATIONS,
by B. B. Kazhinskiy. 1 Apr 63, 171p.
FTD TT62 1923 Unclassified report

Trans. from Izdatel'stvo Akademii Nauk Ukrainskoy SSR, pp. 1-168, 1962.

Descriptors: (*Parapsychology, Communication theory), (*Reviews, Parapsychology), (*Bionics, Communication theory), Brain, Nervous system, Bibliographies.

Contents: A CLEAR CASE OF BIOLOGICAL RADIO COMMUNICATION: Searching for Analogies; The Nervous System and Radio Engineering; The First Sallies Into the Open; Laboratory Experiments. AMONG THE QUADRUPED AND FEATHERED FRIENDS OF V. L. DUROV: The Dog Mars Puts the Skeptics to Shame; I Play the Part of a Test Subject; The Faraday Cage; The Two-Number Riddle; Decisive Experiments of Soviet Scientists; Radio Communication Among Insects. RAYS OF VISION: Electricity Everywhere; The Yogis Have Known It for a Long Time; A Word About Emotions. THE EAR: AN ANALYZER OF BIO-ELECTRO-MAGNETIC WAVES OF ACOUSTICAL FREQUENCY: Two-Way Communication Circuits in the Nerves; Pain at a Distance. HOW MATTER (BRIN) THINKS: Memory, A Kind of Hysteresis; Neurons and a Telegraph Cable; Reflex Arches; Memory Storage. K. E. TSIOLKOVSKIY ON TELEPATHY: Professor Ivantsov's Doubts; My Rebuttal; But I Am Not Alone; A. V. Leontovich's Work Supports the Theory of Biological Radio Communication; Our Ranks Are Steadily Growing. THE FRIENDS AND ENEMIES ABROAD: Interesting Observations in Canada; Thousands of Kilometers Away; Some Results and Prospects. (Author)

AD-415 678 Div. 28
(TISTB/AAR) OTS price $3.60

Vanderbilt U., Nashville, Tenn.
THE EFFECT OF NATURAL AND INDUCED AFFECT ON AUTONOMIC AND INTELLECTUAL FUNCTIONING,
by J. Robert Mack and Carroll E. Izard. Apr 63, 30p. TR15
Contract Nonr214903
Unclassified report

Descriptors: (*Emotions, Analysis), Psychology, Behavior, Therapy, Anxiety, Design, Determination, Theory.

AD-415 719 Div. 28
(TISTB/CCH) OTS price $1.60

Vanderbilt U., Nashville, Tenn.
AFFECT, PERSON-PERCEPTION, AND BEHAVIOR,
by Carroll E. Izard. Apr 63, 10p. Technical rept. no. 13
Contract Nonr214903
Unclassified report

Descriptors: (*Behavior, Perception), (*Personality, Analysis), Social communication, Sociometrics, Adjustments (Psychology), Attitudes, Emotions.

Fundamentally affect is a construct referring to the neurophysiological process underlying what we commonly term feelings and emotions. There are two classes of affect--positive and negative or pleasant and unpleasant. Within each class there are many subtle gradations of tone and intensity--feelings and emotions. Although affect is a neuro-physical process, it is dynamically related to all ego-relevant behavior; it is always present and always inhibiting or facilitating to some degree. Much of the time it is an ideo-affective-physical process; that is, much of the time affectivity has a cognitive element. (Author)

AD-415 728 Div. 28
(TISTM/REB) OTS price $1.00

Florida State U., Tallahassee.
EFFECTS OF STIMULUS SIMILARITY AND DELAY ON TRANSFER OF TRAINING,
by Joel Greenspoon and John E. Anderson, Jr.
Apr 63, 39p.
Contract AF33 616 6408, Proj. 7183, Task 718306
AMRL TDR63 26 Unclassified report

Descriptors: (*Transfer of training, Stimulation), Psychomotor tests, Motor reactions, Vision, Learning, Test construction (Psychology)

This research was concerned with the effects of stimulus similarity and delay on transfer to a visual-motor task. Subjects were trained on the same stimulus value and then retrained on the same or different stimulus values after varying intervals of time. The results indicated that both variables significantly affected the amount of positive transfer, although the results were not unequivocal. The greatest amount of transfer occurred on stimulus values that were closest to the stimulus value of original trainint. Mereover, the longer time intervals between original learning and test of transfer tended to produce the greater amount of transfer. The transfer effect tended to be short-lived in that subjects who had no prior experience with the task were performing as well as the subjects with prior experience after a relatively small number of trials. (Author)

AD-415 769 Div. 28
(TISTM/AMS) OTS price $2.60

National Training Labs., Washington, D. C.
FACTORS PRODUCING DEFENSIVE BEHAVIOR WITHIN GROUPS.
Final technical rept., 1 Feb 60-31 Dec 62,
by Jack R. Gibb. 31 Dec 62, 28p.
Contract Nonr308800
Unclassified report

Descriptors: (*Group dynamics, Behavior), (*Psychology, Group dynamics), Attention, Attitudes, Fear, Motivation, Reaction (Psychology), Theory, Sociometrics.

This report summarizes the empirical research and theory produced on a nine-year program designed to investigate the factors producing defensive behavior within groups. The structure and assumptions of a comprehensive defense-reductive theory of social behavior are briefly described, and related to the empirical research performed under three contracts. A summary is given of instances of practical tests of the theory in industrial, community, and educational settings. The research program is viewed in part as a test of a tri-partite theory of research technology. (Author)

AD-415 936 Div. 28
(TISTB/WA) OTS price $3.60

American Inst. for Research, Palo Alto, Calif.
LEARNING VIA PROGRAMED READING AND CUE VERSUS RESPONSE IN PROGRAMED READING,
by Wayne Hershberger. July 63, 1v. Technical rept. nos. 5 and 6
Contract Nonr307700
Unclassified report

Descriptors: (*Learning, Reading), (*Reading, Effectiveness), Textbooks, Design, Effectiveness, Statistical data, Analysis of variance.

AD-416 010 Div. 28
(TISTB/CCH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
PSYCHIATRIC INTERVIEWING AND MULTISTAGE DECISION PROCESSES OF ADAPTIVE TYPE,
by Richard Bellman, Merril Friend and Leonard Kurland. Aug 63, 9p. Memo. no. RM3732NIH
Grant RG9608
Unclassified report

Descriptors: (*Psychiatry, Decision making), (*Decision making, Psychiatry), Adaptation (Physiology), Adjustment (Psychology), Simulation, Test methods.

The present paper is intended as a prelude to subsequent papers in which we shall describe in detail various simulations of different phases of psychiatric interviewing, and the techniques that can be used to construct these simulation processes. In the following pages, we shall provide a nontechnical lexicon of such fundamental concepts as 'decision process,' 'multistage process,' 'policy,' 'information pattern,' 'adaptive policy,' and 'sequential machine.' (Author)

AD-416 052 Div. 28, 8, 23
(TISTB/CCH) OTS price $6.60

Applied Psychological Services, Wayne, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION. A MULTIDIMENSIONAL SCALING ANALYSIS OF THE CIRCUIT TYPES REPAIRED BY NAVAL AVIATION ELECTRONICS TECHNICIANS,
by Douglas G. Schultz and Arthur I. Siegel.
July 63, 53p.
Contract Nonr227900
Unclassified report

Descriptors: (*Electronics, Training), (*Transfer of training, Job analysis), (*Job analysis, Electronics), Performance tests, Standards, Standardization, Applied psychology, Maintenance, Maintenance personnel.

This is the third in a series of studies investigating the applicability of multidimensional scaling techniques in the job performance area. In this study, the circuits repaired by Naval aviation electronics technicians in the performance of their duties were used as the stimulus materials. Similarity judgments among the circuit pairs were made by supervisory personnel and analyzed by multidimensional scaling methods. It is concluded that it is feasible and fruitful to apply multidimensional scaling techniques to the classification of electronic circuits worked on in the performance of Naval jobs. The avionic circuits repaired by Naval aviation electronics technicians, as represented in the circuit list developed in the study, were perceived as involving sixteen underlying dimensions. (Author)

AD-416 145 Div. 28
(TISTB/AAR) OTS price $1.10

National Research Council of Canada, Div. of Pure Physics.
THE PICTURE DESCRIPTION TEST: A PRELIMINARY REPORT,
by Carroll E. Izard, Don H. Randall, and Eugene S. Cherry. Apr 63, 6p. Technical rept. no. 16
Contract Nonr214903
Unclassified report

Descriptors: (*Perception, Measurement), (*Photographs, Perception), Reflexes, Pictures, Personality, Social sciences.

This study is a part of a program of research which has as one of its major concerns the development of methods for measuring the perceptual-affective response to persons as stimuli. The work represents an effort toward developing a technique for measuring deviant responses to pictured persons. (Author)

AD-416 153 Div. 28
(TISTB/WA) OTS price $8.60

Institute for Research, State College, Pa.
THE OPTIMAL STRATEGIES IN SOME SIMPLE FUNGUS-EATER GAMES,
by Masanao Toda. July 63, 87p.
Contract AF19 628 2968, Proj. 4690, Task 469003
ESD TDR63 406 Unclassified report

Descriptors: (*Decision making, Game theory), (*Game theory, Decision making), Behavior, Theory, Probability, Sequential analysis.

Fungus-eater games yield a class of sequential decision tasks which involve both means objects and end objects in a not-too-unrealistic fashion. Study of human strategies and of the optimal strategies in these games may improve our understanding of complex decision tasks. The optimal strategies for the three simplest fungus-eater games are derived and the behavior of humans playing these games is reported. (Author)

AD-416 491 Div. 28, 12
(TISTB/CCH) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
SURVEY OF RECOMMENDATIONS BY HUMAN FACTORS ENGINEERING EVALUATORS DURING ARMY MISSILE SYSTEMS DEVELOPMENT PROGRAMS,
comp. by Gerald Chaikin. 28 Aug 63, 15p.
AMC RA RC S63 1 Unclassified report

Descriptors: (*Human engineering, Guided missiles), Design, Research program administration.

This study classifies and tabulates 1311 human factors engineering recommendations funished by an ''independent'' evaluating activity during the design and development of seven Army Missile Systems. The tabulated data was obtained from assessments of entire systems, rather than system segments. The information contained herein indicates those human factors engineering areas which have been of prime concern to evaluators during research and development. The principal purpose for providing this ''quick-look'' summary is to stimulate added awareness of and attention to these areas during initial design stages of future missile systems. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

No Entries

30. RESEARCH AND RESEARCH EQUIPMENT

AD-415 627 Div. 30, 8
(TISTE/JBM) OTS price $2.60

Aerial Measurements Lab., Northwestern U., Evanston, Ill.
SOLID STATE ANALOG-TO-DIGITAL CONVERTER.
Quarterly progress rept. no. 5, May-July 63, by Paul G. Sedlewicz and Robert E. Onley. July 63, 20p.
Contract NOw62 0749
Unclassified report

Descriptors: (*Analog-to-digital converters, Semiconductor devices), (*Semiconductor devices, Analog-to-digital converters), Equations, Electric currents, Encapsulation, Circuits, Display systems, Solid state physics.

Research was continued on a program to determine the feasibility of fabricating a solid state analog-to-digital converter. A revision to the empirical equation previously presented relating the probe cutoff current to the reverse bias of the PN bevel is given. Characteristics of a potted device are presented and discussed along with the external circuitry used for visual display. (Author)

AD-415 641 Div. 30
(TISTP/JP) OTS price $3.60

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INFLUENCE OF THERMAL EFFECTS ON THE OPERATING SPEED OF SUPERCONDUCTING COMPUTER ELEMENTS (Vliyaniye Teplovykh Effektov na Bystrodeystviye Sverkhprovodyashchikh Elementov Vychislitel'noy Mashiny),
by R. A. Chentsov. 18 Apr 63, 34p.
FTD TT62 1867 Unclassified report

Trans. from Elektronnyye Vychislitel'nyye Mashiny Moskva, pp. 1-45, 1961.

Descriptors: (*Cryogenic storage devices, Temperature), (*Computer storage devices, Operation), Superconductivity, Superconductors, Heating.

Thermal effects in the trapped flux superconducting memory element are investigated. Those effects orignate in the Joule heating during switching process. The recommendations how to minimize undesirable overheating effects are given. (Author)

AD-415 647 Div. 30
(TISTE/JBM) OTS price $8.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN INSTRUMENT FOR THE INVESTIGATION OF THE PULSE PROPERTIES OF MAGNETIC CORES (STAND S-2) (Pribov dyla Izucheniya Impul'snykh Svoystv Magnitnykh Serdechnikoye (Stend ''S-2'')),
by Yu. I. Vizun. 22 Apr 63, 81p.
FTD TT62 1864 Unclassified report

Trans from Elektronnyye vyschislitel'nyye mashivy Moskva pp. 1-82, 1961.

Descriptors: (*Magnetic cores, Instrumentation), Models (Simulation), Ferrites, Radiofrequency pulses, Magnetic properties, Electrical properties, Polarization, Test equipment (Electronics), Circuits.

The requirements on an approach to the design of an instrument for the investigation of the properties of small magnetic cores under pulse conditions are discussed. A detailed description of the experimental model of suck an instrument and methods for operating with it are given. (Author)

AD-415 648 Div. 30, 22, 8
(TISTE/JBM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF MEASURING THE PROPAGATION VELOCITY OF SHOCK WAVES,
by I. Jakab and A. Zaharescu. 26 Apr 63, 16p.
FTD TT63 313 Unclassified report

Trans. from Academie de la Republique Populaire Roumaine, Revue de Mechanique Appliquee, 7:1, pp. 173-183, 1962.

Descriptors: (*Shock waves, Measurement), (*Measuring devices (Electrical and electronic), Shock waves), Propagations, Velocity, Timing devices, Chronographs.

An account is given of a method of measuring wave propagation velocity. The measurement is based on recording the time interval between wave passage in front of two stationary markers placed at a known distance. The instant of passage is detected by special low-inertia capacitive pick-ups. The time interval is measured by an electron chronograph, specially constructed for this purpose. The chronograph circuit contains original elements which increase the compactness and simplicity of the apparatus. The method ensures a measurement accuracy within 0.2-0.5% in a velocity range of Mach 1-4. (Author)

AD-415 675 Div. 30, 15
(TISTP/HG) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TRANSACTIONS OF THE ALL-UNION CONFERENCE ON COMPUTER MATHEMATICS AND COMPUTER APPLICATION. 3-8 FEBRUARY 1958 (SELECTED ARTICLES).
23 Apr 63, 62p.
FTD TT62 1853 Unclassified report

Trans. from Trudy Vsesoyuznogo SovesHchaniya Po Vychislitel'noy Matematike I Primeneniyu Sredstv Vychislitel'noy Tekhniki, 3-8 Fevralya 1958 Goda, Izdatel'stvo Akademii Nauk Azerbayzhanskoy SSR, Baku, pp. 23-34, 71-93, 155-176, 1961.

Descriptors: (*Computers, Mathematics), (*Programming languages, Theory), (*Mathematical logic, Programming), Transformations (Mathematics), Computer storage devices, Input-output devices, Magnetic tape.

AD-415 696 Div. 30
(TISTE/JWS) OTS price $6.60

Little, Arthur D, Inc., Cambridge, Mass.
A DOUBLE COMPOUND THERMAL IMAGING SYSTEM FOR THE

DEVELOPMENT OF HIGH-TEMPERATURE ELECTRONIC MATERIALS.
Final rept.,
by David L. Richardson. June 63, 63p. Rept. no. C63789
Contract AF19 604 8465, Proj. 4619, Task 46190
AFCRL 63 196 Unclassified report

Descriptors: (*Furnaces, Radiant heating panels), Thermal radiation, Xenon lamps, Radiometers, Calorimeters, Photomultipliers, Reflectors, Heating elements, Measurement, Power supplies.

A double compound-reflective thermal imaging system is described which is provided with two 10-kw xenon compace-arc thermal radiant heat sources. Each lamp is capable of irradiating one side of a sample approximately 3 x 5 mm with thermal flux densities up to 1400 watt/square cm. In comparison with a single compound-reflective thermal imaging system, the double system provides twice the power capacity at the image and is capable of raising the sample temperature by 18 percent. In addition to the 10-kw xenon lamps, three additional radiant heat sources were tested: (1) a heated graphite element (2) a radio-frequency-heated tantalum carbide element and (3) a 2.5 kw xenon compact-arc lamp. Instrumentation for measuring the radiant flux density includes: (1) a double-sided foil radiometer, (2) a total-heat-flux absolute back-body-cavity calorimeter and (3) a photomultiplier-tube radiation probe. (Author)

AD-415 721 Div. 30
(TISTP/HG) OTS price $4.60

System Development Corp., Santa Monica, Calif.
MANAGEMENT OF COMPUTER PROGRAMMING FOR COMMAND AND CONTROL SYSTEMS. A SURVEY,
by K. Heinze, N. Claussen and V. LaBolle.
8 May 63, 43p. Rept. no. TM903 000 02
Contract SD97
Unclassified report

Descriptors: (*Command and control systems, Programming (Computers)), Personnel, Personnel management, Preparation, Tables, Data.

Reports findings of a survey of seven computer programming efforts for command and control systems. Considers the characteristics of computer programming, including its growth, military use, and personnel. Discusses management difficulties such as unavailability of a computer and the effects of customer delay in design decisions. Concludes that knowledge of managing and developing computer programming systems must be extended and detailed, and that programming must be formalized. (Author)

AD-415 797 Div. 30
(TISTB/CCH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
TECHNICAL APPENDIX ON THE SIMSCRIPT SIMULATION PROGRAMMING LANGUAGE,
by Bernard Hausner and Harry M. Markowitz.
Aug 63, 15p. Memo. RM3813PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Programming language, Simulation), Logistics, Manufacturing methods, Computers.

This paper presents material which can be of value in advanced applications of SIMSCRIPT. SIMSCRIPT is a programming language which was especially developed to reduce the time required to initially code and subsequently modify simulation programs. It has been used in the simulation of a wide variety of systems including logistics, manufacturing and computer operations. (Author)

AD-415 824 Div. 30, 25, 6
(TISTP/FEM) OTS price $1.10

Aerospace Information Div., Washington, D. C.
THREE-STAGE PHOTOELECTRIC TRANSISTORIZED SERVOSYSTEM.
6 June 63, 9p.
AID T63 81 Unclassified report

Trans. from Iskusstvennyye sputniki zemli. Izd-vo AN SSSR, no. 14, pp. 74-80, 1962.

Descriptors: (*Servomechanisms, Tracking), (*Photoelectric cells (Semiconductor), Balloon equipment), (*Instrumentation, Transistors), Error, Measurement, Solar radiation, Photoreceptors, Lenses, Mirrors, Sensitivity, Power supplies, Alternating current, Circuits, Amplifiers, Electronic equipment, Servo amplifiers.

Description of a tracking system designed for installation in the gondola of a free balloon, and intended for the continuous orienting of solar measurement equipment (actinometric, spectral, ozonometric, etc.) toward the sun durin g investigation of direct solar radiation in the free atmosphere is presented. (Author)

AD-415 828 Div. 30, 14, 4
(TISTM/TCG) OTS price $1.00

Sperry Products, Inc., Danbury, Conn.
FEASIBILITY STUDY TO DETERMINE WHETHER ULTRASONIC TECHNIQUES CAN BE USED TO MEASURE MECHANICAL PROPERTIES OF CAST POLYURETHANES INTENDED FOR APPLICATION AS SOLID PROPELLANT BINDERS,
by A. M. Murdoch and H. E. VanValkenburg. July 63, 32p.
Contract AF33 616 7069, Proj. 7360, Task 736005
ASD TDR62 886 Unclassified report

Descriptors: (*Isocyanate plastics, Mechanical properties), (*Ultrasonic radiation, Test methods), (*Solid rocket propellant binders, Isocyanate plastics), Attenuation, Velocity, Measurement, Test equipment, Castings, Acoustics, Aging (Materials).

The purpose of this project is to determine the feasibility of utilizing ultrasonic techniques to measure mechanical properties of cast polyurethanes. Two suppliers prepared and delivered several series of specimens simulating both binder and propellant materials in various conditions of aging. Ultrasonic examination was performed of these specimen materials with the objective of finding ultrasonic properties which would indicate their physical condition. Results of tests indicate a significant dependence of both shear wave attenuation and relative acoustic impedance of certain specimen materials on their condition of aging. (Author)

AD-415 945 Div. 30
(TISTP/FEM) OTS price $6.60

Wolf Research and Development Corp., West Concord, Mass.
INVESTIGATION OF SPACE PROBE DATA CONDITIONING

AND REDUCTION METHODS.
Final rept.,
by Daniel B. Brzezenski, Jerome Cohn, Donald Morrison, and James Sexton. 20 June 63, 53p.
Contract AF19 628 1611, Proj. 7659, Task 765905
AFCRL 63 852 Unclassified report

Descriptors: (*Data processing systems, Scientific satellites), (*Digital systems, Telemetering data), (*Programming (Computers), Programming languages), Magnetic tape, Analog-to-digital converters, Digital computers, Instrumentation.

The data collection and processing methods of the scientists conducting rocket probe and satellite experiments were studied. The best procedures to be used for data conditioning, decommutation, and digitizing for entry into a large scale computer were recommended and a trial program written and tested to substantiate the recommendations. The results of this research are presented. The digitizing equipment, the desired data formats, and the data processor programs are described. (Author)

AD-416 008 Div. 30, 18
(TISTB/CCH) OTS price $4.60

MITRE Corp., Bedford, Mass.
ATTACK GENERATOR: A FORTRAN PROGRAM FOR SUBJECTING A SYSTEM TO AN ATTACK,
by W. A. McCloskey. Aug 63, 19p. Rept. no. TM3615
Contract AF19 628 2390, Proj. 477L
ESD TDR63 293 Unclassified report

Descriptors: (*Military strategy, Simulation), (*Operations research, Mathematical analysis), (*Programming (Computers), Bombing), Analysis.

The FORTRAN program, ''Attack Generator,'' described in this document, has been written for the NUDETS system. The program is designed to add random errors to a planned, time sequence attack, to obtain a ''real'' attack situation, and to determine which specified points in the attack area are destroyed. With the exception of the output sections, the program was designed so that it can be used to subject any system to an attack of the type described in this document. (Author)

AD-416 161 Div. 30, 26
(TISTE/CAM) OTS price $2.60

SKF Industries Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Progress rept nos. 10-12, Mar-May 61,
by Roye C. Munsell, Edwin Jink and Olof Gustafsson. May 61, 23p. AL61L021
Contract NObs78593
Unclassified report

Descriptors: (*Test sets, Calibration), Vibration, Measurements, Bearings, Test methods.

Electro-mechanical calibration of several Anderometer amplifiers with MEA 100 transducer was accomplished. A study of the influence of the mechanical elements of the Anderometer on bearing vibration readings was undertaken. Two samples of bearings near either end of the instrument size range were tested on several mechanical Anderometer assemblies using the same electrical system and pickup. For comparison, vibration testers were also employed to test the bearings. The effect of the various mechanical elements on the vibration readings was investigated and considerable effect was found. (Author)

AD-416 179 Div. 30, 26
(TISTE/CAM) OTS price $4.60

SKF Industries, Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Progress rept. no. 5 for period ending Oct 60,
by Edwin Fink and Olof Gustafsson. Oct 60, 3p.
Rept. no. L60L030
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Test sets, Calibration), Vibration, Measurement, Bearings.

AD-416 180 Div. 30, 26
(TISTE/CAM) OTS price $1.60

SKF Industries Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Progress rept. no. 6 for period ending Nov 60,
by Edwin Fink and Olof Gustafsson. Nov 60, 11p.
Rept. no. L60L034
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Test sets, Calibration), Instrumentation, Vibration, Measurement, Bearings.

The phenomenon of pickup bounce has been investigated. An experimental method is described for determining the occurrence of pickup bounce under given conditions. Test data pickup are given and the safe (bounce-free) operating range for this pickup determined. (Author)

AD-416 181 Div. 30, 26
(TISTE/CAM) OTS price $4.60

SKF Industries, Inc., Philadelphia, Pa.
CALIBRATION MANUAL FOR THE ELECTRONIC SYSTEM AND PICKUP OF ANDEROMETERS,
by Olaf Gustafson. 25 May 62, 1v. Rept. no. AL62L008
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Vibrators (Electrical), Calibration), (*Test equipment (Electronic), Vibrators (Electrical)), Instrumentation, Test sets, Vibration, Meters, Mechanical drawings, Theory, Measurement, Roller bearings.

The Anderometer is a rolling bearing vibration tester. The purpose of the instrument is to indicate the RMS vibration level, expressed in Anderons, of a bearing with the outer ring kept in a fixed angular position and the inner ring rotating at 1800 RPM. One Anderon, by definition, corresponds to 60 pi microinches/sec. RMS, at a rotational speed of 1800 RPM. The vibration is measured in three frequency bands, nominally 50-300 c (low band), 300-1800 c (medium band) and 1800-10000 c (high band). The Anderometer is designed to measure bearings under light axial load, but no radial load. The Anderometer contains the following main units: (1) A mechanical unit consisting of: (a) A spindle to rotate the inner ring of the test bearing. The test bearing is mounted on a mandrel attached to the spindle by a taper. (b) Spindle drive, consisting of electric motor, pulleys, belts, coupling and jackshaft. (c) A preloader for application of thrust load to the bearing. (d) A stand on which the various parts of the instrument are mounted. (2) A velocity sensitive pickup with a stylus contacting the outer ring of the bearing. (Author)

AD-416 201 Div. 30, 28, 23
(TISTB/CCH) OTS price $16.00

Melpar, Inc., Falls Church, Va.
A STUDY OF GENERALIZED MACHINE LEARNING.
Final technical rept. Feb 62-June 63,
by William H. Fuhr. Aug 63, 228p.
Contract AF33 616 7682, Proj. 4160, Task 416004
ASD TDR63 714 Unclassified report

Descriptors: (*Teaching machines, Bionics), (*Bionics, Analysis), (*Computers, Artificial intelligence), Effectiveness, Cybernetics, Test methods, Computer logic, Perception, Sensory mechanism, Nerve cells, Psychology, Simulation, Man, Vision, Visual acuity.

The training process has been analyzed as a Markov process in a finite state machine. A vector representation of machine inputs and outputs is developed and a method of determining the transition matrix using this representation is presented. Methods are presented for calculating the mean learning time from the transition matrix. Using characteristics of the transition matrix, a theorem is proved which establishes the criterion for a stationary probability distribution of states. A method is also presented for reducing the size of a transition matrix by combining equivalent states. Criteria for identifying equivalent states are defined. The training process is investigated with both stationary and non-stationary environments. With the stationary environment attention is focused on stability and organizability requirements in the training process. An algebraic formulation of machine-environment interaction in a non-stationary environment is also presented. Numerous examples of training with different types of building blocks and different goal criteria are provided and various building blocks are evaluated as to their efficiency in forming logical connectives. Simulation of human depth perception using size and retinal disparity cues demonstrated the ability of the network to organize so as to make optional use of available information. (Author)

AD-416 210 Div. 30, 26
(TISTE/CAM) OTS price $1.10

SKF Industries, Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Progress rept. no. 1 for 30 June 60,
by Edwin Fink. June 60, 3p.
Contract NObs78593
Unclassified report

Descriptors: (*Test sets, Calibration), Vibration, Measurement, Bearings.

Work was initiated to clarify certain points in existing calibration procedures. Mechanical loading devices for the test bearing were studied to determine their influence on the vibration readings. (Author)

AD-416 251 Div. 30, 26
(TISTE/CAM) OTS price $1.60

SKF Industries Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Progress rept. no. 3 for 31 Aug 60,
by Edwin Fink and Olof Gustafsson. 31 Aug 60,
4p. Rept. L60L021
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Test sets, Calibration), Vibration, Measurement, Bearings, Mechanical drawings.

A mechanical loading device has been developed and is recommended as a standard device for the Anderometers to be calibrated within this contract. The new device has so far been built for use on two sizes of bearings. The test results are superior to results on other loading devices tested and generally superior to hand loading. (Author)

AD-416 259 Div. 30, 26
(TISTE/CAM) OTS price $1.10

SKF Industries, Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Progress rept. no. 2 for 31 July 60,
by Edwin Fink and Olof Gustafsson. 31 July 60,
2p. Rept. no. L60L016
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Test sets, Calibration), Vibration, Measurement, Bearings, Mechanical drawings.

The work on the development of a mechanical loading device for the test bearing continued. Preliminary studies were made to develop methods for the evaluation of spindle impedance. (Author)

AD-416 301 Div. 30
(TISTB/AAR) OTS price $2.60

MITRE Corp., Bedford, Mass.
ASSOCIATIVE MEMORY COMPUTERS FROM THE PROGRAMMING POINT OF VIEW,
by T. Singer and P. Schupp. Aug 63, 19p. Rept. no. W5492
Contract AF33 600 39852, Proj. 707
ESD TDR63 245 Unclassified report

Descriptors: (*Computers, Programming), Memory, Design, Electronics, Computer logic.

The concept of associative memory is studied, with attention to the effects on computer design and the likelihood of implementation in the present or near future. The writers examine critically the views of all associative memory investigators known to them. Particular attention is paid to the programming implications of associative memory, and the ideas are tested through a detailed study of three programming problems chosen from widely separated areas. (Author)

AD-416 392 Div. 30, 25, 9
(TISTM/AMS) OTS price $1.60

Avco Everett Research Lab., Everett, Mass.
A GRAPHITE INERT GAS HEATER FOR MHD STUDIES,
by J. Klepeis. May 63, 11p. Rept. no. AMP116
Contract AF04 694 33
BSD TDR63 109 Unclassified report

Descriptors: (*Heaters, Gases, (*Gases, Heaters), (*Magnetohydrodynamics, Heaters), Argon, High temperature research, Electrical conductance, Ionization, Potassium, Cesium, Graphite, Thermal conductivity, Thermal stresses, Design, Laboratory equipment, Test equipment, Tests.

This paper describes the design and construction of a graphite inert gas heater used for MHD

studies at temperatures up to 2000 K. Heater performance and two methods for making the high temperature inert gas electrically conductive are described. (Author)

AD-416 394 Div. 30, 3
(TISTP/FEM) OTS price $8.60

Kansas U., Lawrence.
A COMPUTER PROGRAM FOR THE DESIGN OF FIRED TURBULAR REACTORS WITH TWO-PHASE FLOW,
by Leigh E. Stamets. July 63, 90p.
Unclassified report

Master's thesis.

Descriptors: (*Programming (Computers), Design), (*Chemical industry, Instrumentation), Digital computers, Petroleum industry, Chemical engineering, Chemical reactions, Gases, Numerical analysis, Computers, Pipes, Pipe bends.

A computer program is presented for an industrially important type of continuous reactor, namely a fired tubular reactor used for thermal carcking or visbreaking of gas oils under such conditions that two fluid phases coexist. A computer program for use on the IBM 1620 was developed to design fired tubular reactors heated in a cracking furnace. The program applies to two-phase flow with liquid reactants and gas products from a first-order reaction. (Author)

AD-416 399 Div. 30
(TISTM/TCG) OTS price $7.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
APPLICATION OF CRYOGENIC TECHNIQUES TO COMPUTER TECHNOLOGY,
by Robert W. Horn. 22 July 63, 1v.
NADC EL6309 Unclassified report

Descriptors: (*Computers, Cryogenics), (*Cryogenics, Computers), (*Materials, Computers), Films, Superconductivity, Magnetic properties, Processing, Preparation, Hysteresis, Transition temperature, Switching circuits, Thickness, Magnetic fields, Semiconductors, Semiconducting films, Thin films (Storage devices).

The application of cryogenics to computer technology is one of the studies undertaken to meet the project requirements. This report summarizes the results of this study. The material presented is the result of: (1) experimental ''in-house'' fabrication and testing of superconducting films and circuits; (2) analysis of published cryogenics literature; and (3) conversations with the personnel in industry engaged in research and developmental activities in this field. (Author)

AD-416 431 Div. 30
(TISTP/MFA) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
SECONDARY STATE ASSIGNMENT FOR SEQUENTIAL MACHINES,
by Zvi Kohavi. Mar 63, 26p. Research rept. no. PIBMRI1174 63
Grant AF AFOSR453 63
AFOSR 5159 Unclassified report

Descriptors: (*Machines, Sequences), (*Input-output devices, Design), Synchros, Circuits, Combinatorial analysis, Automation, Synthesis.

One of the most important and complicated problems in the synthesis of a sequential machine, described by a state diagram or table is the assignment of the states of the secondary variables to the states of the machine. The secondary assignment for a given machine varies in accordance with the requirements of the design. It has already been shown that the partition with the substitution property is of great significance in the secondary assignment. However, only few machines possess these properties, and hence, a more general method is needed. This paper presents a method for obtaining for any given machine M an equivalent machine M' which has a partition with the substitution property and therefore can be decomposed into several submachines connected in cascade or in parallel. It is also shown that for machine M' we can find an assignment with self dependent subsets. The method is shown to be general for any completely or incompletely specified sequential machine. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-415 683 Div. 31
(TISTE/OHD) OTS price $2.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
HEAVING AND PITCHING MOTIONS OF SUPERVENTILATED HYDROFOIL CRAFT IN IRREGULAR SEAS,
by Richard P. Bernicker. June 63, 12p. Rept. no. 958
Contract Nonr263 20, Proj. 018, Task Nr062 212
Unclassified report

Descriptors: (*Hydrofoil boats, Pitch (Motion)), (*Motion, Hydrofoil boats), Tests, Analysis, Frequency, Water waves, Spectrum analyzers.

An experimental investigation of the heaving and pitching motions of a fully-ventilated, surface-piercing dihedral hydrofoil craft was performed to ascertain the validity of applying linear superposition techniques. Tests were carried out in regular waves to obtain the response operators of the craft. The pitching and heaving motions were then measured in long-crested irregular seas and analyzed using spectral techniques. It was found that the motion spectra in irregular seas could be predicted with reasonable accuracy using the regular wave response operators with the wave spectrum of the sea. (Author)

AD-415 772 Div. 31, 6
(TISTM/TCG) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
THE ACOUSTIC RANGE MEASURING SYSTEM,
by Jay C. Brown and William G. Niner. July 63, 13p.
Proj. S F013 11 01
DTMB Rept. no. 1754 Unclassified report

Descriptors: (*Acoustic ranges, Measurement), (*Submarines, Acoustic impedance), Hydrophones, Noise, Noise analyzers, Sound signals, Sound transmission, Submarine noise, Instrumentation, Test facilities, Electronic equipment, Timing devices.

The Acoustic Range Measuring System (ARMS), with a range capability of 5000 yd, has been developed for radiated-noise trials. This system determines range by measuring the transit time of an acoustic pulse traveling from a submarine to a receiving hydrophone. The use of synchronized clocks requires the acoustic pulse to travel only one way, thus resulting in greater range capability. ARMS has been used on several radiated-noise trials with good results. (Author)

AD-416 407 Div. 31
(TISTE/JBM) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
A SIMPLIFIED ANALYSIS OF THE HYDROELASTIC INSTABILITY OF A THREE-DIMENSIONAL HYDROFOIL,
by Michael E. McCormick. Aug 63, 17p. Rept. no. 1555
Unclassified report

Descriptors: (*Flutter, Hydrofoils), (*Hydrofoils, Flutter), Control surfaces, Two-dimensional flow, Hydrodynamics, Elasticity, Stability, Velocity, Analysis, Experimental data, Loading (Mechanics), Differential equations.

The two-dimensional flutter equations of Theodorsen are modified to approximate three-dimensional circulation and virtual mass conditions. This is accomplished by multiplying the circulation and virtual mass terms of the two-dimensional equations by appropriate factors. The circulation factor is the ratio of the three-dimensional to the two-dimensional steady lift expressions. The virtual mass factor is the ratio of the three-dimensional to the two-dimensional virtual mass expressions. Results of the modified analysis are compared with results obtained experimentally for a foil with aspect ratio of 3.0 and analytically from the two-dimensional theory. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-415 642 Div. 32
(TISTP/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
WORLD WITHOUT GRAVITY.
23 Apr 63, 4p.
FTD TT63 300 Unclassified report

Trans. from Izvestiya, p. 4, 1 Sept 62.

Descriptors: (*Weightlessness, Manned spacecraft), Periodicals, Education.

Popular discussion of weightlessness features experienced by Russian Astronauts during Space Flight. (Author)

AD-416 248 Div. 32
(TISTB/CCH) OTS price $11.50

Boston U., School of Public Relations and Communications, Mass.
A STUDY OF PUBLIC COMMUNICATIONS PROBLEMS IN CREATING A BETTER UNDERSTANDING OF SCIENCE AND TECHNOLOGY,
by Robert Hermann. 1963, 1v.
Unclassified report

Master's thesis.

Descriptors: (*Public relations, Scientific research), (*Scientific relations, Public relations), (*Newspapers, Sociology), Sociometrics, Social communications, Newspapers, Public opinion, Attitudes, Population, Training, Education, Management engineering.

This study reviews some of the salient causes and effects of what some have called the ''scientific revolution.'' One of these effects has been the development of the technical means to make available vast amounts of information to the masses. Those concerned with the problem of increasing public understanding of science and technology believe that part of the solution is to increase the quantity and quality of science information in the mass media. The links in the communication chain between science and the public are identified along with some of the problems facing each. Some of the limited research available concerning the level of public understanding of science and public attitudes toward science and scientists is reviewed. The performance of the scientist as a source of public information, the newsman as an interpreter of science, and the media manager as a gatekeeper of science information are analyzed. Special emphasis is placed on the role and responsibility of a comparatively new link in the mass communication chain, the public relations practitioner. (Author)

33. TRANSPORTATION

AD-415 753 Div. 33, 2
(TISTA/GEC) OTS price $2.60

Federal Aviation Agency, Washington, D. C.
IDLEWILD WEATHER AND TRAFFIC FLOW,
by Richard M. Warfield. July 63, 23p.
Proj. 150 2S
Unclassified report

Descriptors: (*Terminal flight facilities, Air traffic), (*Airports, Air traffic), Climatology, Meteorology, Visibility, Ceiling.

A compilation of a number of tables and graphs containing results of supplemental analyses of the data used to prepare ''An Analysis of the Effect of Weather on Traffic Flow at New York International Airport,'' are presented. The study by the Weather Bureau was made under Project Agreement FAA/SRDS-A-111 for the Weather Research Branch, Systems Research and Development Service, Federal Aviation Agency. Investigation has been continued by the Weather Research Branch through Contract FAA ARDS-605 with Airborne Instruments Laboratory. (Author)

AD-415 925 Div. 33, 1, 2
(TISTA/VGW) OTS price $4.60

Federal Aviation Agency, Washington, D. C.
COMMON AVIATION WEATHER SYSTEM DETAILED DESIGN.
Summary rept.
Dec 62, 42p.
Unclassified report

Descriptors: (*Civil aviation, Weather forecasting), Weather forecasting, Weather communications, Operations research, Meteorology, Data processing systems, Design, Research program administration.

To satisfy the common requirements of civil

and military aviation for operational weather support, the Federal Aviation Agency is developing the Common Aviation Weather System (CAWS) as an integral part of the National Aviation System. The evolutionary CAWS design was reported in its entirety in ''Detailed Design-Common Aviation Weather System,'' FAA, December 1962. This summary, based on the detailed design report, identifies the principal features of CAWS operation, major equipment items, and an orderly sequence of steps for realizing the system. (Author)

AD-416 321 Div. 33, 13
(TISTM/BRW) OTS price $13.50

Massachusetts Inst. of Tech., Cambridge.
THEORETICAL ANALYSIS OF THE BEHAVIOR OF RIGID AIRFIELD PAVEMENTS FOR THE CASE OF INTERIOR LOADING,
by James Otis Putnam. June 63, 1v.
Unclassified report

Doctoral thesis.

Descriptors: (*Airports, Pavements), (*Pavements, Deflection), Loading (Mechanics), Numerical analysis, Moments, Load distribution, Theory, Design, Equations, Concrete, Reinforced concrete, Thickness, Failure (Mechanics), Structures, Mathematical analysis, Elasticity, Stresses, Civil engineering.

A general analytical solution is developed for the investigation of deflection and bending moments of a rigid pavement for the case of a static load applied at the interior of the pavement at some distance from any edge. The solution is based upon the concept of a ''dense liquid'' foundation and a distribution of the wheel load over a circular area, the general solution reduces to the Westergaard solution for determination of maximum deflection and maximum bending moment (for radii of relative load distribution less than one). A relationship is also developed to permit the investigation of the influence of multiple wheel loads. The solution, although utilized to investigate specifically the behavior of rigid airfield pavements, is equally applicable to the investigation of rigid highway pavements. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

BIBLIOGRAPHY

Order from GPO $1.25 as
S 18.2:Sci2/Readings

Agency for International Development, Washington, D. C.
A SELECTED LIST OF U.S. READINGS ON DEVELOPMENT PREPARED FOR THE UNITED NATIONS CONFERENCE ON THE APPLICATION OF SCIENCE AND TECHNOLOGY FOR THE BENEFIT OF THE LESS DEVELOPED AREAS, by Saul M. Katz and Frank McGowan, Pittsburgh U. Graduate School of Public and International Affairs. 13 Dec 62, 376p 1195refs

DESCRIPTORS: *Economics, *Bibliographies, *Natural resources, *Population, *Labor, *Education, *Sociology, *Public health, *Agriculture, *Industries, *Transportation, *Communication systems, Scientific organizations

The preparation of a list of selected U.S. readings on the application of science and technology to the problems of the less-developed nations will serve many useful purposes. This volume is a representative sample of current American research papers, academic studies, and operational reports on major areas of science and technology. The items in this collection were selected because of their potential utility to the developing nations. It covers a wide range of subjects such as the regional planning experience of the Tennessee Valley Authority and Puerto Rico, the production and marketing policies of our great industrial enterprises, and the role of our universities in concerting research and education in the service of human welfare. This reading list emphasizes the deep American concern with the individual. The great emphasis on science and technology in this country has not precluded consideration of human needs. Each of the subject chapters, whether agriculture, industry, or communication, includes many readings that focus on the human aspects of the subject. All of the subjects illustrate how science and technology can be applied for man's welfare.

TID-3043(Rev. 2, Suppl. 1) OTS $2.00

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
BIBLIOGRAPHIES OF INTEREST TO THE ATOMIC ENERGY PROGRAM, comp. by Richard J. Smith, Naomi K. Smelcer, and Hugh E. Voress. Mar 63, 92p 556refs

Order from GPO $0.40 as
NS 1.23:962

National Science Foundation, Washington, D. C.
CURRENT PROJECTS ON ECONOMIC AND SOCIAL IMPLICATIONS OF SCIENCE AND TECHNOLOGY, 1962, by Theodore Suranyi-Unger, Jr. and Suzanne Dovydenas. Jan 63, 131p
NSF-63-8

DESCRIPTORS: *Science, *Economics, *Sociology, *Labor, *Scientific personnel, *Personnel management, *Foreign policy, *Patents, History, Psychology, *Industries, *United States Government, *Decision making, Scientific research, *Agriculture, Bibliographies.

Contents:
Agriculture and rural sociology;
General economic analysis
Automation and impacts on labor
Scientific and engineering manpower performance education, and creativity
Administration, organization, and management
International and foreign studies
Patents and trademarks
History and philosophy of science and technology
Sociology and psychology
Innovation, including impacts of specific inventions and new processes
Economic development
Impacts on selected industries
Public policy, government, and national defense
Decision-making

AGRICULTURE

Plant Cultivation

TID-18441 OTS $1.10

Cornell U., Ithaca, N. Y.
THE LOSS OF ORGANIC AND INORGANIC MATERIALS FROM ABOVE-GROUND PLANT PARTS, WITH ESPECIAL REFERENCE TO DECONTAMINATION OF PARTS UTILIZED FOR FOOD. Progress rept. by H. B. Tukey, Jr. 1963, 6p 6refs
Contract AT(30-1)2598

TID-17929 OTS $2.60

Michigan State U., East Lansing.
FOLIAR AND ROOT ABSORPTION AND DISTRIBUTION OF PHOSPHORUS AND CALCIUM IN THE STRAWBERRY, by R. A. Norton and S. H. Wittwer. 4 Dec 62, 28p 21refs
Contract AT(11-1)888.

ASTRONOMY

Astrophysics

Order from GPO $0.40
NAS 1.12:148

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE CRITICAL INCLINATION PROBLEM IN SATELLITE ORBIT THEORY, by William A. Mersman. 1962, 31p 11refs
Technical rept. R-148; NASA N63-13723

DESCRIPTORS: *Satellites (Artificial), *Celestial mechanics, *Orbital trajectories, *Inclined orbit trajectories, Theory, Equations of motion, Trigonometry

Solutions of the satellite orbit problem are obtained that do not exhibit singularities at the critical inclination angle. Series representations are obtained, their regions of convergence are exhibited, and quantitative measures of their speeds of convergence are provided for use in numerical computations. (Author)

NASA N63-21044 OTS $8.60

IIT Research Inst., Chicago, Ill.
STUDIES OF LUNAR SOIL MECHANICS. Final rept. by E. Vey and J. D. Nelson. Jul 63, 100p 57 refs
Contract NASr-65(02)
IITRI proj. M272; NASA CR-50930

BEHAVIORAL SCIENCES

Order from GPO $0.20 as
Pr 35.8:Sci2/M31/rp.1

President's Science Advisory Committee, Washington, D. C.
MEETING MANPOWER NEEDS IN SCIENCE AND TECHNOLOGY. REPORT NUMBER ONE: GRADUATE TRAINING IN ENGINEERING, MATHEMATICS, AND PHYSICAL SCIENCES. 12 Dec 62, 48p 15refs

DESCRIPTORS: *Scientific personnel, *Training, *Science, *Engineering, *Mathematics, Personnel management, Education, Universities, Students, Costs, Federal Government

Contents:
The task
Introduction
The national role of scientific and technological manpower
Enhancing the manpower supply
Special needs for manpower in engineering, mathematics, and physical sciences
A program to meet the needs
Goals
Limitations and means for overcoming them
Scope and cost of the recommended national program
The federal role
Responsibilities for funding
Mechanisms for supporting graduate students: emphasis on the training grant
Leadership and coordination

BIOLOGICAL SCIENCES

HW-SA-2359 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
ECOLOGICAL COMPARISON OF ANNUAL HARVEST YIELDS IN AN ARCTIC AND A DESERT PLANT COMMUNITY, by W. H. Rickard. 18 Dec 61, 9p 3refs
Contract AT(45-1)1350

HW-SA-2470 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE LENGTH OF DEERMICE IN RELATION TO VEGETATION ZONES IN SOUTHEASTERN WASHINGTON AND NORTHERN IDAHO, by W. H. Rickard and R. E. Nakatani. 2 Mar 62, 6p 3refs
Contract AT(45-1)1350

HW-SA-2526 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
NEW RING-BILLED GULL COLONIES ON COLUMBIA RIVER ISLANDS IN EASTERN WASHINGTON, by W. C. Hanson. 9 May 62, 5p
Contract AT(45-1)1350

TID-14613 OTS $2.60

Los Alamos Scientific Lab., N. Mex.
CLINICAL USE OF THE ARM COUNTER IN BLOOD CLEARANCE STUDIES, by C. C. Lushbaugh and R. L. Schuch. 24p 9refs
Contract W7405-eng-36
LADC-5102

OTS SB-495, Suppl. 1 OTS $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
PARASITOLOGY, PARASITES, AND PARASITIC INFECTIONS (ANIMAL, INCLUDING HUMAN). Jul 63, 28p 320refs OTS Selective Bibliography SB-495, suppl. 1

DESCRIPTORS: *Parasites, *Parasitic infections, *Bibliographies, Animals, Man, Veterinary medicine.

Lists 320 domestic and foreign references on parasitology, parasites, and parasitic infections added to the OTS collection from May 1962 through July 1963. Includes reports on parasitology and parasites (general); helminths (general, and specific; trematodes, cestodes, nematodes; arthropods (ticks, mites, diptera, lice, fleas, flies, etc.); protozoa (plasmodium, leishmania, trypanosoma, coccidia, toxoplasma, piroplasma, etc.);

parasitic infections (general, and specific: echinochasmosis, elephantiasis, filariasis, leishmaniasis, malaria, paragonimiasis, piroplasmosis, Q-fever, schistosomiasis, spirochetosis (including leptospirosis), tick-borne encephalitis, toxoplasmosis, tularemia, etc.). (Author)

NASA N63-20892 OTS $2.00

Republic Aviation Corp., Farmingdale, N. Y.
STUDY OF SENSORY DEPRIVATION, PAIN AND PERSONALITY RELATIONSHIPS FOR SPACE TRAVEL. Final rept., 1 Nov 61-31 Oct 62, by J. Peters, F. B. Benjamin, W. M. Helvey, and G. A. Albright. Sep 63, 72p. 28refs
Contract NASr-74
Technical note D-2113

Anatomy and Physiology

BNL-5913 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
ORIGIN OF ELECTRIC CURRENTS IN LIVING SYSTEMS, by Leslie F. Nims. 25 Feb 62, 30p 9refs
Contract AT(30-2)GEN-16

BNL 5474 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
THE SUPPORTING CONNECTIVE TISSUE FRAMEWORK OF THE FEMUR, by Edgar A. Tonna. 24 Jul 61, 35p 22refs
Contract AT(30-2)GEN-16

TID-18333 OTS $1.60

Massachusetts Inst. of Tech., Cambridge.
AUTORADIOGRAPHIC INVESTIGATION OF BRAIN METABOLISM UNDER NORMAL, EXPERIMENTAL AND PATHOLOGICAL CONDITIONS. Annual progress rept. 15 June 62-15 Mar 63, by Joseph Altman. 16p 19refs
Contract AT(30-1)3045

TID-18338 OTS $1.10

Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.
PHYSIOLOGICAL STUDIES ON CONGENITAL DEFORMITY IN MICE. MECHANISM OF ACTION OF RADIATION AND RADIOMIMETIC TREATMENTS. Final rept. 1 Dec 54-30 Nov 62 by Charles P. Dagg and Meredith N. Runner. 1 Apr 63, 9p 7refs
Contract AT(30-1)1762.

Biochemistry

BNL-6838 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
BIOCHEMICAL BASIS FOR THE OBLIGATE PHOTOAUTOTROPHY OF GREEN BACTERIA OF THE GENUS CHLOROBIUM, by Robert M. Smillie and W. R. Evans. 1962, 18p 32refs
Contract AT(30-2)GEN-16

BNL-5727 OTS $7.60

Brookhaven National Lab., Upton, N. Y.
THE EFFECTS OF IONIZING RADIATION ON ENZYMES, by L. G. Augenstine. 10 Jan 62, 72p 274refs
Contract AT(30-2)GEN-16

TID-18410 OTS $1.10

Minnesota U., Minneapolis.
STUDY OF ENZYMIC PHOSPHORYLATION REACTIONS WITH O^{18} AND P^{32}, AND STUDIES OF BASIC ENZYMIC MECHANISMS WITH AID OF ISOTOPES. Final rept. 1 Feb 55-31 Jan 63, by P. D. Boyer. 31 Jan 63, 10p Prepared in cooperation with Minnesota U., St. Paul. Coll. of Agriculture, Forestry, and Home Economics.
Contract AT(11-1)341

PB 163 790 OTS $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
OXYGEN CONSUMPTION IN NORMAL SUBJECTS PERFORMING THE MODIFIED HARVARD STEP TEST, by R. D. Starke and R. G. Bartlett, Jr. 28 Feb 62, 9p 3refs
Proj. MR005.13-7004, rept. no. 14

DESCRIPTORS: *Oxygen consumption, *Metabolism, Exercise.

By use of recently decribed new, simple technique, accurate measurements of oxygen consumption during seven graded stress loads on the Harvard Step Test are presented. Comparisons to the conventional Master's test for coronary reserve are presented. (Author)

Microbiology

BNL-6888 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
ENERGY TRANSFER AND CYTOCHROME OXIDATION IN GREEN BACTERIA, by John M. Olson and Christiaan Sybesma. 1963, 22p 17refs
Contract AT(30-2)GEN-16

BNL-6874 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
LIGHT-INDUCED ABSORBANCY CHANGES IN RHODOMICROBIUM VANNIELII, by John M. Olson and Sigehiro Morita. 1963, 15p 13refs
Contract AT(30-2)GEN-16

BNL-6873 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
THE PROTEIN-CHLOROPHYLI-770 COMPLEX FROM GREEN BACTERIA, by John M. Olson, David Filmer, Roger Radloff, Carol A. Romano, and Christiaan Sybesma. 1963, 18p 12refs
Contract AT(30-2)GEN-16

BNL-6864 OTS $1.60

Emory U., Ga.
THE ORGANIZATION OF MOVEMENT IN SLIME MOLD PLASMODIA, by Peter A. Stewart 1962, 12p 10refs Prepared in cooperation with Brookhaven National Lab., Upton, N. Y.
Contract AT(30-2)GEN-16 and Grant PHS G-E-1433

Pathology

BNL-6018 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
PATHOGENESIS AND REGENERATION OF RADIATION INDUCED BONE MARROW INJURY, AND THERAPEUTIC IMPLICATIONS, by T. M. Fliedner, E. P. Cronkite, and V. P. Bond. 23 Apr 62, 34p 35refs
Contract AT(30-2)GEN-16

TID-18510 OTS $1.60

New England Center Hospital, Boston, Mass.
BONE MARROW PRESERVATION AND TRANSPLANTATION. Progress rept. 1 Jun 62-31 May 63. 1 Apr 63, 12p 5refs
Contract AT (30-1)2032.

PB 163 719 OTS $1.60

School of [Aerospace] Medicine, Brooks AFB, Tex.
DYSBARISM. A REVIEW OF 35 CASES WITH SUGGESTIONS FOR THERAPY, by William G. Malette, John B. Fitzgerald, and Abraham T. K. Cockett. Apr 61, 18p 26refs
Review 3-61

DESCRIPTORS: *Decompression sickness, Therapy, *Shock (Pathology), Edema, Brain, *Embolism, *Space medicine, Blood volume, Aviation medicine, Barometeric pressure.

The pathogenesis of dysbarism continues to be obscure. Experimental work in small animals is in progress, but no clinical research is being done in this area. Enough data are available, however, to furnish a basis for a rational approach to treatment of clinical cases. Thirty-five reported clinical cases of dysbarism have been reviewed. Nineteen of the patients survived, while 16 had a fatal outcome. Autopsy studies were carried out on all members of the latter group. The available clinical data and mortiality statistics are summarized.

Pharmacology and Toxicology

TID-16709 OTS $1.10

Argonne National Lab., Ill.
UTILIZATION OF THYMIDINE AS AN INDICATOR OF DRUG EFFECT UPON CANCER CELLS, by G. O. McDonald, A. N. Stroud, B. R. Svoboda, and A. M. Brues. Jun 62, 3p Prepared in cooperation with Illinois U. Coll. of Medicine
Contract W31-109-eng-38
UAC-6526

UR-620 OTS $2.60

Rochester U. [School of Medicine and Dentistry] N. Y.
THE METABOLISM OF HYDROCORTISONE IN THE ISOLATED PERFUSED DOG KIDNEY, by Frank M. Ganis and Leon L. Miller. 20 Dec 62, 21p 22refs
Contract W7401-eng-49 and PHS Grant HF-6137

Radiobiology

TID-14698 OTS $1.60

Argonne National Lab., Ill.
ACQUIRED RADIORESISTANCE, by Howard H. Vogel, Jr., and Donn L. Jordan. Oct 61, 14p 5refs
Contract W31-109-eng-38
UAC-5786

TID-16977 OTS $1.60

Argonne National Lab., Ill.
AGING OF RAPIDLY AND SLOWLY RECOVERING COMPONENTS OF LETHAL RADIATION INJURY IN MICE, by George A. Sacher and Douglas Grahn. Jun 62, 16p
Contract W31-109-eng-38
UAC-6604

TID-13231 OTS $1.10

Argonne National Lab., Ill.
ANTIGEN DISAPPEARANCE IN HIBERNATING GROUND SQUIRRELS (CITELLUS TRIDECEMLINEATUS), by Bernard N. Jaroslow and Douglas E. Smith. May 61, 9p 4refs
Contract W31-109-eng-38
UAC-5218

TID-16877 OTS $1.10

Argonne National Lab., Ill.
HIGH RESOLUTION AUTORADIOGRAPHIC AND MICRORADIOGRAPHIC STUDIES OF BONE AND TEETH FROM HUMAN RADIUM CASES, by R. E. Rowland. Jul 62, 5p
Contract W31-109-eng-38
UAC-6661

TID-18499 OTS $1.60

Connecticut U., Storrs.
THE EFFECTS OF TRITIUM OXIDE OF AQUATIC ORGANISMS. Summary and progress rept. 1 Jan 62-31 Jul 63, by Donald M. Skauen. 5 Apr 63, 11p 2refs
Contract AT(30-1)3039

HW-SA-2281 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
ARRESTED DEVELOPMENT IN X-RAYED LARVAE OF EPHESTIA KUEHNIELLA ZELLER (LEPIDOPTERA: PHYCITINAE), by H. E. Erdman. 8p 10refs
Contract AT(45-1)1350

TID-13613 OTS $1.60

Los Alamos Scientific Lab., N. Mex.
THE GROWTH OF MONODISPERSE POPULATIONS OF MAMMALIAN CELLS EXPOSED TO INTERNAL BETA IRRADIATION, by Donald F. Petersen. 15 Sep 61, 18p 12refs
Contract W7405-eng-36
LADC-4796

TID-14490 OTS $1.60

Los Alamos Scientific Lab., N. Mex.
A UNIVERSALLY APPLICABLE METHOD FOR ASSAYING THYROID FUNCTION IN VERTEBRATES, by C. C. Lushbaugh. 9 Jan 62, 11p 7refs
Contract W7405-eng-36
LADC-5121

TID-18260 OTS $4.60

New England Center Hospital, Boston, Mass.
DEVELOPMENT OF SMALL IN VIVO B-RAY DETECTORS AND THEIR DIAGNOSTIC APPLICATIONS, I. SUMMARY OF DEVELOPMENT WORK TO DATE, FINAL REPORT. II. EVALUATION PROGRAM AT NEUROSURGICAL CENTERS OF BRAIN TUMOR LOCALIZATION UNITS USED AT OPERATION WITH P^{32}. Progress rept by Charles V. Robinson. 28 Feb 63, 41p 53refs
Contract AT(30-1)1726

TID-18414 OTS $1.10

Purdue Research Foundation, Lafayette, Ind.
THE RELATIONSHIP BETWEEN SOMATIC AND GENETIC RESPONSE OF TOMATO SEED AND POLLEN TO X-IRRADIATION USING WATER PROTECTION AND MUTATIONS AT SPECIFIC LOCI. Final rept. by Allan B. Burdick. 15 Mar 63, 10p
Contract AT(11-1)856

UR-623 OTS $9.60

Rochester U. [School of Medicine and Dentistry, N. Y.]
THE EFFECT OF ORALLY ADMINISTERED EPSILON AMINOCAPROIC ACID ON THE DEPOSITION AND/OR RETENTION OF RADIOIODINATED FIBRINOGEN AND ANTIBODIES TO FIBRINOGEN IN SUBCUTANEOUS RAT PLASMA CLOTS AND TURPENTINE-INDUCED ABSCESSES OF THE RAT, by Letitia Eleanor Mutschler. 25 Jan 63, 117p 43refs
Contract W7401-eng-49.

BNL-6896 OTS $3.60

Yale U., New Haven, Conn.
EVALUATION OF SPONTANEOUS, CHEMICAL, AND RADIATION-INDUCED MUTATIONS IN THE PINACEAE, Francois Mergen. Rept. on Contract AT(30-1)2755. 63, 34p 54refs Prepared in cooperation with Brookhaven National Lab., Upton, N. Y. 54refs

CHEMISTRY

IS-634 OTS $3.60

Ames Lab., Iowa State U. of Science and Tech.
A STUDY OF THE RARE EARTH METAL PROPIONATE COMPLEXES, by George Stephen Paul and Jack E. Powell. Jan 63, 34p 27refs
Contract W7405-eng-82

TID-14716 OTS $1.60

Argonne National Lab., Ill.
STABILITY CONSTANTS OF CERTAIN LANTHANIDE-(III) AND ACTINIDE(III) CHLORIDE AND NITRATE COMPLEXES, by D. F. Peppard, G. W. Mason and I. Hucher. Nov 61 13p 13refs
Contract W31-109-eng-38
UAC-5777

TID-3564(Rev. 1) OTS $0.75

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
MOLTEN SALTS: SELECTED REFERENCES, comp. by William E. Bost. Mar 63, 34p 415refs

NAA-SR-MEMO-8239 OTS $1.10

Atomics International, Canoga Park, Calif.
CARBON REMOVAL FROM SODIUM BY FILTRATION, by S. K. Lee. 22 Feb 63, 10p 3refs
Contract AT(11-1)GEN-8

PB 163 701 OTS $1.60

Chicago U., Ill.
CHEMISTRY OF GALLIUM. Progress rept., 1 Oct-30 Nov 48, by Henry Taube. [1948] 11p 4refs
Contract N6ori-20, T.O. 16
TIP-U52-514

DESCRIPTORS: *Gallium, Chemistry, Solubility, *Ammonium compounds, Gallium compounds, *Chlorides, *Electrochemistry

Work is reported on the solubility of gallium in gallium dichloride; on the nature of the solution of NH_4GaCl_4 in diethyl ether; and on the association of Ga^{+++} and Cl^- in aqueous solution.

HW-SA-2959 OTS $3.60

Hanford Atomic Products Operation, Richland, Wash.
AMINE SYSTEMS IN SOLVENT EXTRACTIONS, by W. E. Keder, A. S. Wilson, and L. L. Burger.
3 Apr 63, 32p 47refs
Contract AT(45-1)1350.

HW-SA-2414 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
RATES OF THERMAL POLYMERIZATION OF SEVERAL POLYPHENYL COMPOUNDS, by D. R. de Halas and E. C. Gilbert. 25 Jan 62, 12p 10refs
Contract AT(45-1)1350

TID-18418 OTS $6.60

Institute for the Study of Rate Processes, U. of Utah, Salt Lake City.
MERCAPTAN INHIBITION OF THE DEPOLARIZATION OF A SMOOTH PLATINUM CATHODE. Technical rept. no 44, by Joel Jacknow and Henry Eyring.
15 Mar 63, 62p 44refs
Contract AT(11-1)1144

TID-13401 OTS $1.10

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
EVALUATING REFLUX AND DRAINAGE IN FOAM FRACTIONATIONS, by L. B. Rogers and John W. Oliver. 17 Aug 61, 3p 4refs
Contract AT(30-1)905

LADC-5711 OTS $5.60

Los Alamos Scientific Lab., N. Mex.
THE T_{62} He^3 TEMPERATURE SCALE. I. NEW VAPOR PRESSURE COMPARISONS, by S. G. Sydoriak and R. H. Sherman. 1962, 51p 39refs
Contract W7405-eng-36

NYO-9874 OTS $2.60

Massachusetts Inst. of Tech., Cambridge.
THE CRYSTAL AND MOLECULAR STRUCTURE OF BIS(TRIMETHYLPHOSPHINE OXIDE) COBALT(II) DINITRATE, by F. A. Cotton and R. H. Soderberg.
20 Mar 63, 29p 24refs
Contract AT(30-1)1965

TID-17922 OTS $3.60

Massachusetts Inst. of Tech., Cambridge.
POLAROGRAPHY AND ELECTRODE PROCESSES, by T. B. King and W. Ledeboer. 5 Dec 62, 31p 9refs
Contract AT(30-1)1985

NYO-9875 OTS $1.10

Massachusetts Inst. of Tech., Cambridge.
THERMODYNAMIC, SPECTRAL AND STRUCTURAL STUDIES OF COMPLEX IONS. 30 Mar 63, 7p
Contract AT(30-1)1965

TID-18273 OTS $1.60

New York U., N. Y.
TECHNICAL PROGRESS REPORT NO. 2190 ON TRANSPORT NUMBER MEASUREMENT. 7 Jan 63, 12p 11refs
Contract AT(30-1)1938

TID-18276 OTS $1.10

Oak Ridge Gaseous Diffusion Plant, Tenn.
INFRARED SPECTRA OF ZENON COMPOUNDS, by D. F. Smith. 25 Mar 63, 9p
Contract W7405-eng-26

ORNL-TM-543 OTS $2.60

Oak Ridge National Lab., Tenn.
SEPARATION OF PROTACTINIUM FROM THORIUM IN NITRIC ACID SOLUTIONS BY SOLVENT EXTRACTION WITH TRIBUTYL PHOSPHATE OR BY ADSORPTION ON PULVERIZED UNFIRED VYCOR GLASS OR SILICA GEL, by J. G. Moore and R. H. Rainey. Rept. on Contract W7405-eng-26. 8 Apr 63, 27p. 6refs.

TID-18440 OTS $1.10

Rensselaer Polytechnic Inst., Troy, N. Y.
AN INVESTIGATION OF COMPLEX IONS IN FUSED SALT MEDIA. Progress rept., by Ronald A. Bailey.
Apr 63, 5p
Contract (30-1)2787.

NYO-10173 OTS $2.60

Union Carbide Nuclear Co., Tuxedo, N. Y.
RESEARCH IN ACTIVATION ANALYSIS. Quarterly progress rept. Dec 62-Feb 63. by Henry H. Kramer, Victor J. Molinski, and Werner H. Wahl. 29 Mar 63, 24p 13refs
Contract AT(30-1)2975

TID-18415 OTS $11.00

Yale U., New Haven, Conn.
DIFFUSION OF BINARY NON-AQUEOUS SYSTEMS, I. DIFFUSION OF HYDROCHLORIC ACID IN AQUEOUS SOLUTIONS AND IN DIOXANE-WATER MIXTURES, II, Doctoral thesis, by Jerry Adams Harpst. 1962, 144p 79refs
Contract AT(30-1)1349

TID-18413 OTS $9.60

Yale U., New Haven, Conn.
SELF-DIFFUSION AND THERMAL DIFFUSION IN ORGANIC LIQUIDS, by James Davis Birkett. 1962, 118p 37refs
Contract AT(30-1)1349

TID-18399 OTS $1.10

Yale U., New Haven, Conn.
THE THERMODYNAMIC PROPERTIES OF THE SYSTEM: HYDROCHLORIC ACID, LITHIUM CHLORIDE AND WATER FROM 15 to 35°, by Herbert S. Harned. [1963] 7p 8refs
Contract AT(30-1)1349

TID-18349 OTS $1.60

Yale U., New Haven, Conn.
TRANSPORT AND THERMODYNAMIC PROPERTIES OF SOLUTIONS. Annual progress rept. 1 Jan 62-1 Jan 63 27 Mar 63, 15p
Contract AT(30-1)1375.

Analytical Chemistry

ORNL-TM-523 OTS $4.60

Oak Ridge National Lab., Tenn.
GAS CHROMATOGRAPHIC ANALYSIS OF BIPHENYL PYROLYTIC PRODUCTS, by L. B. Yaetts, Jr., J. E. Attrill, and W. T. Rainey, Jr. 13 Mar 63, 41p 5refs
Contract W7405-eng-26

TID-15070 OTS $2.60

Savannah River Lab., Aiken, S. C.
PRECISE AUTOMATIC COLORIMETRY ANALYSIS IN THE LOW PARTS PER BILLION RANGE, by R. D. Britt, Jr. 9 Mar 62, 22p 9refs
Contract AT(07-2)1

Physical Chemistry

PB 163 712 OTS $2.60

Florida State U. [Tallahassee].
ACID DISSOCIATION CONSTANTS AND ACIDITY IN THE SYSTEM METHANOL-WATER, PART I, by A. L. Bacarella, Ernest Grunwald, and Henry P. Marshall. [1954] 27p 32refs
Contracts DA 01-[009]-ORD-188 and Nonr-99802
AD-32 577

DESCRIPTORS: *Thermochemistry, Chemical equlibrium, *Dissociation, *Solvents, *Methanols, Water, Solvent action, *Formic acids, *Acetic acids, *Propionic acids, Fatty acids, *Benzoic acids, *Anilines, Ions, Molecular structure.

Thermodynamic pK_A values were measured for formic, acetic, propionic butyric, and benzoic acid, and for anilinium, N-methyl anilinium and N-dimethyl anilinium ion in methanol-water solvents containing 0, 20, 40, 60, 80, and 95 volume per cent methanol. The pK_A values were measured by means of the cell: glass electrode/H^+, Cl^-, other solutes/AgCl-Ag, using a Beckman model G pH meter and a simple adaptation of the differential potentiometric procedure. The results in 95% methanol indicated the formation of appreciable amounts of intimate ion pairs, such as $Na^+ Cl^-$ and $Na^+ RCO_2^-$, similar in nature to ion pair intermediates visualized in solvolysis reactions. Errors in pK_A values because of ion association and liquid junctions, such as exist in the cell: glass electrode/solution X/KCl (saturated, aqueous)/Hg_2Cl_2-Hg, were estimated. (DDC abstract)

UCRL-6450-T(Rev. I) OTS $4.60

Lawrence Radiation Lab., U. of California, Livermore.
EQUATION OF STATE OF CHEMICAL SYSTEMS OF CHARGED PARTICLES, by S. G. Brush, H. E. DeWitt, and J. G. Trulio. 15 May 62, 44p 56refs
Contract W7405-eng-48

TID-14533 OTS $1.10

Los Alamos Scientific Lab., N. Mex.
CRYSTALLOGRAPHIC DATA, 1, 3, 5-TRIAMINO-2, 4, 6-TRINITROBENZENE, by Howard H. Cady. 16 Jan 62, 8p
Contract W7405-eng-36
LADC-5135

PB 163 820 OTS $4.60

Arctic, Desert, Tropic Information Center, Air U., Maxwell AFB, Ala.
INVESTIGATION OF ATMOSPHERIC REFRACTION AT LOW ALTITUDES, by Kaj G. Strand. Feb 53, 46p 7refs
ADTIC Publication no. A-102; AD-6452

DESCRIPTORS: *Atmospheric refraction, Measurement, Photographic analysis, Barometric pressure, Atmospheric pressure, *Moon, *Stars, *Tables.

This report was incorrectly announced as PB 163 665

Order from GPO $0.15 as
I 19.13:1544-G

Geological Survey, Washington, D. C.
CALCULATION OF RESISTANCE AND ERROR IN AN ELECTRIC ANALOG OF STEADY FLOW THROUGH NONHOMOGENEOUS AQUIFERS. GENERAL GROUND-WATER TECHNIQUES, by Robert W. Stallman. 1963, 23p 15refs
Geological Survey Water-Supply paper 1544-G

DESCRIPTORS: *Hydrology, *Fluid flow, *Water, Porous materials, *Models (Simulations), Mathematical models, Analog systems.

Several types of nonhomogeneous aquifers were modeled using resistance elements to represent finite sections of the aquifer. Various design equations were used to calculate model resistance in selected problems. Flow solutions obtained from the models qualitatively demonstrate the desirability of carefully selecting the design equation so as to minimize the model size for attaining a given accuracy of solution. Criteria are established which show the types of variations of transmissibility that can be modeled by making resistance inversely proportional to transmissibility without regard for spacing of the model grid.

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I 19.3:1619-W

Geological Survey, Washington, D. C.
CHEMICAL QUALITY OF SURFACE WATERS IN PENNSYLVANIA. CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES, by Charles N. Durfor and Peter W. Anderson. 1963, 54p 38refs
Geological Survey Water-Supply paper 1619-W

DESCRIPTORS: *Hydrology, *Water supplies, *Pennsylvania, Chemical properties, Geochemistry.

Variations in the chemical quality of the surface waters in Pennsylvania are caused by areal differences in geology, urban and industrial development, mining, quarrying, land use, and runoff. Waters having the least dissolved solids are found in the glaciated northeastern and northwestern parts of the State; waters having higher values of hardness are found in the limestone terranes in the south-eastern and south-central parts. In the anthracite coal fields in the northeast and in the bituminous coal fields in the southwest, many streams receive acid mine drainage, which lowers the alkalinity and increases the sulfate content of the waters.

Order from GPO $0.20 as
I 19.13:1696-A

Geological Survey, Washington, D. C.
DETERMINATION OF BETA ACTIVITY IN WATER. RADIOCHEMICAL ANALYSIS OF WATER, by F. B. Barker and B. P. Robinson. 1963, 35p 11refs
Geological Survey Water-Supply paper 1696-A

DESCRIPTORS: *Water supplies, *Radiological contamination, *Natural radioactivity, Chemical analysis, *Radiochemistry, *Geochemistry, *Beta particles, Counting methods, Beta counters, Radioactive waste disposal, Hydrology

The disintegration of radioactive atoms is a random process subject to established methods of statistical analysis. Because many water samples contain small amounts of radioactivity, low-level counting techniques must be used. The usual assumption that counting data follow a Gaussian distribution is invalid under these conditions, and statistical analyses must be based on Poisson distribution. The gross beta activity in water samples is determined from the residue left after evaporation of the sample to dryness. Evaporation is accomplished first in a teflon dish, then the residue is transferred with distilled water to a counting planchet and again is reduced to dryness. The radioactivity on the planchet is measured with an anticoincidence-shielded, low-background, beta counter and is compared with measurements of a strontium-90-yttrium-90 standard prepared and measured in the same manner. Control charts are used to assure consistent operation of the counting instrument.

Order from GPO $3.25 as
I 19.13:1601

Geological Survey, Washington, D. C.
SALINE-WATER RESOURCES OF NEW MEXICO, by James W. Hood and Lester R. Kister. 1962, 82p 68refs
Geological Survey Water-Supply paper 1601

DESCRIPTORS: *Water supplies, *Salinity, *Natural resources, *New Mexico, Geological survey, Hydrology, Data.

Order from GPO $0.20 as
I 19.16:434-C

Geological Survey, Washington, D. C.
USE OF CORRELATION TO IMPROVE ESTIMATES OF THE MEAN AND VARIANCE. STATISTICAL STUDIES IN HYDROLOGY, by Myron B. Fiering. 1963, 11p 7refs
Geological Survey Professional Paper 434-C

DESCRIPTORS: *Hydrology, Fluid flow, *Correlation techniques, *Statistical processes, Analysis of variance.

An examination of the criteria for extending streamflow records by correlation.

NYO-10329 OTS $1.25

Massachusetts Inst. of Tech., Cambridge.
THE ADAPTATION OF NEW RESEARCH TECHNIQUES TO MINERAL ENGINEERING PROBLEMS. Semi-annual progress rept. for the period ending 30 May 63. 31 Jul 63, 50p 5refs
Contract AT(30-1)956.

SCTM-5-63(72) OTS $9.60

Sandia Corp., Albuquerque, N. Mex.
STUDY OF SURFACE METEOROLOGICAL OBSERVATIONS FOR BARKING SANDS, KAUAI, HAWAII, AND UPPER-LEVEL WIND MEASUREMENTS MADE AT BARKING SANDS AND LIHUE, KAUAI, HAWAII, AND JOHNSTONE ISLAND, by R. F. Gentzler and C. A. Olson. Mar 63, 118p 3refs
Contract AT(29-1)739

PB 163 760 OTS $8.10

Aeronautical Chart and Information Center, St. Louis, Mo.
APPLICATIONS OF SPHERICAL HARMONICS TO GEODETIC PROBLEMS, by James L. Dragg. Feb 63, 82p 45refs
ACIC Reference pub. no. 15

DESCRIPTORS: *Geodesics, *Special functions (Mathematical), *Gravity, Gravity anomalies, Geophysics, Scientific satellites, *Harmonic analysis

The report summarizes an investigation into the development of the Earth's gravitational potential in shperical harmonics and the geometric significance of the lower degree terms. The potential is developed to yield expressions for the geopotential, spheropotential, gravity anomalies, geoid heights, and deflection components in spherical harmonics. The data includes theoretical methods and procedures for the computation of harmonic coefficients from terrestial gravimetry. Satellite orbital data has been used in several studies to derive harmonic coefficients. The theory, method, and formulas used for determining the coefficients of the second and fourth zonal harmonics are presented. Other applications and discussions concerning the determination of the ellipticity of the equator, balancing the gravity field, normalized harmonics, and resonant orbits complete this reference. (Author)

Order from GPO $0.50 as
NAS 1.12:136

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A STUDY OF THE FREE OSCILLATIONS OF THE EARTH, by Gordon J. F. MacDonald and Norman F. Ness. 1962, 48p 53refs
Technical rept. R-136; NASA N63-13859; AD-274 562

DESCRIPTORS: *Earth, Lithosphere, *Oscillation, *Geophysics, Seismic waves, Equations of motion, Rotation, Harmonic analysis.

Published observations on the toroidal oscillations of the earth are critically reviewed. A supplementary analysis of the record obtained by the Lamont strain seismometer is presented. Eleven toroidal modes are identified and it is concluded that the periods are known to within one percent. A perturbation scheme involving the ratio of the earth's angular velocity to the resonant frequency is used in calculating the effects on the resonant frequency due to the earth's rotation. The perturbations of the toroidal oscillations due to core-mantle interaction are treated in detail. An exact expression is obtained for the rate of energy dissipated by a finitely conducting plate oscillating across a magnetic field. A calculation of elastic energy in the flow order oscillations suggest a value of 10^{18} ergs/cph for the energy density at low frequencies in the Great Chilean earthquake of May 22, 1960. Various studies of the earth's oscillations, coupled with surface wave investigations, substantiate Gutenberg's hypothesis of a layer of low velocity in the upper mantle.

PNE-234P OTS $1.00

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
STABILITY OF CRATER SLOPES. Preliminary rept. on Proj. SEDAN, by W. C. Sherman, Jr. and W. B. Steinriede, Jr. Apr 63, 38p 6refs

Order from GPO $0.20 as
I 19.3:1140-A

Geological Survey, Washington, D. C.
ADSORPTION OF CESIUM ON CLAY MINERALS. ION EXCHANGE ON MINERAL MATERIALS, by J. S. Wahlberg and M. J. Fishman. 1962, 33p 12refs
Geological Survey bulletin 1140-A

DESCRIPTORS: Adsorption, *Cesium, *Clay minerals, *Ion exchange, *Geochemistry, Measurement.

A study was made of the exchange adsorption of cesium on the clay minerals kaolinite, halloysite, montmorillonite, and "illite." The amount of cesium adsorbed by clay minerals was measured in equilibrium solutions in which the cesium concentration ranged from 10^{-1} to 10^{-10} N, and either sodium, potassium, calcium, or magnesium ions were present in various concentrations. The results obtained in these experiments were used to calculate the distribution coefficients for the adsorption of cesium on clay minerals. At very low cesium concentrations and for a constant concentration of the cation competing with cesium for adsorption sites, the distribution coefficients were found to be independent of the cesium concentration. At higher cesium concentrations, the distribution coefficients were found to depend on both the cesium concentration and the nature and concentration of the competing cation. (Author)

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I 19.16:316-G

Geological Survey, Washington, D. C.
AN AEROMAGNETIC RECONNAISSANCE OF THE COOK INLET AREA, ALASKA. GEOPHYSICAL FIELD INVESTIGATIONS, by Arthur Grantz, Isidore Zietz, and Gordon E. Andreasen. 1963, 25p 27refs
Geological Survey Professional Paper 316-G

DESCRIPTORS: Airborne, *Geophysical prospecting, *Magnetometers, *Alaska, Terrestrial magnetism, Structural geology, Aerial reconnaissance

A regional geologic interpretation of the magnetic field over the Cook Inlet area.

Order from GPO $0.25 as
I 19.13:1667-A

Geological Survey, Washington, D. C.
CHEMICAL EQUILIBRIA AND RATES OF MANGANESE OXIDATION. CHEMISTRY OF MANGANESE IN NATURAL WATER, by John D. Hem. 1963, 68p 28refs
Geological Survey Water-Supply paper 1667-A

DESCRIPTORS: *Manganese, Water, *Geochemistry, Oxidation, Chemical equilibrium, Reaction kinetics, Water supplies.

The relationships between manganese in solution, Eh, pH, and the activities of bicarbonate and sulfate ions are shown by means of seven stability-field diagrams. The behavior of manganese in laboratory experiments is in general agreement with predictions of the diagrams. In distilled water, with an Eh near 0.55 volts and a pH of 7.0, manganese has a solubility of about 1.0 ppm (parts per million). An increase in pH or in Eh tends to lower the solubility. Bicarbonate species in equilibrium with manganese carbonate may control manganese solubility in some systems. Manganese forms soluble complexes with bicarbonate and sulfate. The association constant for $MnHCO_3^+$ ion was determined to be 63. The rate at which divalent manganese is oxidized and precipitated from aerated solutions is sharply increased by increasing the pH. The rate is diminished when sulfate and bicarbonate ions are present.

Order from GPO $0.60 as
I 19.16:440-Y

Geological Survey, Washington, D. C.
DATA OF GEOCHEMISTRY, SIXTH EDITION. CHAPTER Y. MARINE EVAPORITES, by Frederick H. Stewart. 1963, 59p 363refs
Geological Survey Professional Paper 440-Y

DESCRIPTORS: *Geochemistry, *Sea water, *Evaporation, Mineral products, Data.

Contents:
Depositional environment
Lateral variation
Vertical repetition
Mineralogy
Physical chemistry
Natural deposits
Secondary changes

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I 19.16:382-B

Geological Survey, Washington, D. C.
GEOLOGIC EFFECTS OF THE HIGH-EXPLOSIVE TESTS IN THE USGS TUNNEL AREA, NEVADA TEST SITE. GEOLOGIC INVESTIGATIONS RELATED TO NUCLEAR EXPLOSIONS, by J. M. Cattermole and W. R. Hansen. 1962, 39p 6refs
Geological Survey Professional Paper 382-B

DESCRIPTORS: *Underground explosions, *Explosion effects, *Structural geology, Nitroglycerin, TNT, Nevada, Nuclear explosions, *Nuclear weapons tests, Feasibility studies, *Engineering geology.

The purpose of these experiments, and of the subsequent relatively low yield Rainier nuclear blast, was to determine the feasibility of underground detonation as a method of testing atomic devices.

Order from GPO $1.50 as
I 19.16:450-E

Geological Survey, Washington, D. C.
GEOLOGICAL SURVEY RESEARCH 1962. SHORT PAPERS IN GEOLOGY, HYDROLOGY, AND TOPOGRAPHY, ARTICLES 180-239, by Thomas B. Nolan. 193p 450refs
Geological Survey Professional Paper 450-E

DESCRIPTORS: *Geological survey, *Reports, *Geology, *Hydrology, *Terrain

Scientific notes and summaries of investigations prepared by members of the Conservation, Geologic, Topographic, and Water Resources Divisions in the fields of geology, hydrology, topography, and related sciences.

Order from GPO $4.00 as
I 19.16:362

Geological Survey, Washington, D. C.
GEOLOGY AND MANGANESE DEPOSITS OF THE MAPLE AND HOVEY MOUNTAINS AREA, AROOSTOOK COUNTY, MAINE [WITH A SECTION ON] LITHOLOGY AND MINERALOGY OF THE DEPOSITS, by Louis Pavlides and Charles Milton. 1962, 130p 67refs
Geological Survey Professional Paper 362

DESCRIPTORS: *Economic geology, *Ores (Metal sources), *Manganese, *Maine, Stratigraphy, Structural geology, Petrology, Minerals, Natural resources, Mountains

Describes the geology and manganese deposits of a part of the Paleozoic terrane of northeastern Maine.

Order from GPO $1.00 as
I 19.3:1142-A

Geological Survey, Washington, D. C.
GEOLOGY AND MINERAL DEPOSITS IN THE TWIN CRAGS QUADRANGLE, IDAHO, CONTRIBUTIONS TO ECONOMIC GEOLOGY, by Arthur B. Campbell and Stanley E. Good. 1963, 38p 15refs
Geological Survey bulletin 1142-A

DESCRIPTORS: *Economic geology, *Minerals, Petrology, *Natural resources, *Idaho, Structural geology, Geology.

A descriptive report on the geology of a quadrangle at the southwest corner of the Coeur d'Alene mining district.

Order from GPO $2.25 as
I 19.16:378-A

Geological Survey, Washington, D. C.
GEOLOGY AND ORE DEPOSITS OF THE SOUTH SILVERTON MINING AREA, SAN JUAN COUNTY, COLORADO, by David J. Varnes. 1963, 67p 37refs
Geological Survey Professional Paper 378-A

DESCRIPTORS: *Economic geology, *Ores (Metal sources), *Minerals, *Structural geology, *Colorado, Geology, Natural resources

Order from GPO $2.25 as
I 19.16:409

Geological Survey, Washington, D. C.
GEOLOGY AND PETROGRAPHY OF VOLCANIC ROCKS OF THE TRUK ISLANDS, EAST CAROLINE ISLANDS, by J. T. Stark and R. L. Hay. 1963, 47p 31refs
Geological Survey Professional Paper 409

DESCRIPTORS: *Petrology, *Rock (Geology), *Volcanoes, *Pacific Islands, *Geology

A structural, stratigraphic, and petrographic study of the rocks of a highly dissected, partly submerged inactive shield volcano.

Order from GPO $1.00 as
I 19.3:1108-C

Geological Survey, Washington, D. C.
GEOLOGY IN THE FRESHWATER BAY AREA CHICHAGOF ISLAND, ALASKA, MINERAL RESOURCES OF ALASKA, by Robert A. Loney, Willaim H. Condon, and J. Thomas Dutro, Jr. 1963, 60p 24refs
Geological Survey bulletin 1108-C

DESCRIPTORS: *Geological survey, *Alaska, Stratigraphy, Structural geology, Petrology, Geology, Minerals.

General geology of an area underlain largely by middle Paleozoic rocks, with emphasis on stratigraphy, structure, and petrography.

Order from GPO $1.25 as
I 19.3:1121-K

Geological Survey, Washington, D. C.
GEOLOGY OF THE EASTERN PART OF THE MOUNT FAIRWEATHER QUADRANGLE, GLACIER BAY, ALASKA. CONTRIBUTIONS TO GENERAL GEOLOGY, by Darwin L. Rossman. 1963, 60p 24refs
Geological Survey bulletin 1121-K

DESCRIPTORS: *Structural geology, *Petrology, *Alaska, Rock (Geology), Sedimentary rock, Igneous rock, Metamorphic rock, *Geology.

A study of an area of highly recrystallized rocks and complex structures related to the Coast Range batholith.

Order from GPO $1.00 as
I 19.3:1142-B

Geological Survey, Washington, D. C.
GEOLOGY OF THE EWING QUADRANGLE, KENTUCKY AND VIRGINIA, CONTRIBUTIONS TO ECONOMIC GEOLOGY, by K. J. Englund, H. L. Smith, L. D. Harris, and J. D. Stephens. 1963, 28p 15refs
Geological Survey bulletin 1142-B

DESCRIPTORS: *Geological survey, *Stratigraphy, *Kentucky, *Virginia, Geology, *Economic geology.

A description of formations in the central part of the Cumberland overthrust block

Order from GPO $0.60 as
I.19.13:1475-O

Geological Survey, Washington, D. C.
HYDROLOGIC AND GEOLOGIC RECONNAISSANCE OF PINTO BASIN, JOSHUA TREE NATIONAL MONUMENT, RIVERSIDE COUNTY, CALIFORNIA. HYDROLOGY OF THE PUBLIC DOMAIN, by Fred Kunkel. 1963, 28p 8refs
Geological Survey Water-Supply paper 1475-O

DESCRIPTORS: *Hydrology, *Geological survey, *California, Water supplies.

PNE-221F OTS $1.00

Geological Survey, Denver, Colo.
INFILTRATION VELOCITIES AT SEDAN AND SCOOTER CRATERS. Final rept. on Proj. SEDAN, by W. C. Rasmussen. Apr 63, 40p 10refs

Order from GPO $1.25 as
I 19.16:257-B

Geological Survey, Washington, D. C.
LAKE BONNEVILLE: GEOLOGY OF THE SOUTHERN UTAH VALLEY, UTAH. by Harold J. Bissell. 1963, 33p 27refs
Geological Survey Professional Paper 257-B

DESCRIPTORS: *Geological survey, *Utah, Stratigraphy, Structural geology, Engineering geology, Geology.

Stratigraphy, origin, and engineering properties of the unconsolidated deposits of Pleistocene Lake Bonneville.

Order from GPO $0.25 as
I 19.13:1496-D

Geological Survey, Washington, D. C.
OCCURRENCE AND DISTRIBUTION OF STRONTIUM IN NATURAL WATER. CHEMISTRY OF STRONTIUM IN NATURAL WATER, by Marvin W. Skougstad and C. Albert Horr. 1963, 46p 12refs
Geological Survey Water-Supply paper 1496-D

DESCRIPTORS: *Strontium, *Water, *Geochemistry, Water supplies, Test methods, Distribution.

Strontium, an alkaline-earth element chemically similar to calcium and magnesium, occurs in trace quantities in all natural water. Analysis of samples from 75 major rivers of the conterminous United States shows that the strontium concentration ranges from 0.007 to 13.7 ppm (parts per million). The strontium concentration in the total dissolved solids carried by these waters ranges from a few hundredths of a percent to 0.37 percent. The strontium content of ground water has a wider range than that of surface water.

Order from GPO $0.35 as
I 19.16:454-B, C.

Geological Survey, Washington, D. C.
PILLOWED LAVAS, I: INTRUSIVE LAYERED LAVA PODS AND PILLOWED LAVAS, UNALASKA ISLAND, ALASKA. II: A REVIEW OF SELECTED RECENT LITERATURE. SHORTER CONTRIBUTIONS TO GENERAL GEOLOGY, by George L. Snyder and George D. Fraser. 1963, 35p 137refs
Geological Survey Professional Paper 454-B, C

DESCRIPTORS: *Volcanoes, *Igneous rock, *Aleutian Islands, Structural geology, Petrology, *Geology

Order from GPO $0.30 as
I 19.16:414-G

Geological Survey, Washington, D. C.
REDESCRIPTION OF THREE SPECIES OF CORALS FROM THE LOCKPORT DOLOMITE IN NEW YORK. SHORTER CONTRIBUTIONS TO GENERAL GEOLOGY, by William A. Oliver, Jr. 1963, 22p 35refs
Geological Survey Professional Paper 414-G

DESCRIPTORS: *Dolomites, *New York, *Paleontology, Petrology, *Geology.

Descriptions of the syntypes of some corals named by James Hall, 1852.

Order from GPO $2.00 as
I 19.13:1539-M

Geological Survey, Washington, D. C.
SALINE GROUND WATER IN THE ROSWELL BASIN, CHAVES AND EDDY COUNTIES, NEW MEXICO, 1958-59. CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES, by James W. Hood. 1963, 55p 4refs
Geological Survey Water-Supply paper 1539-M

DESCRIPTORS: *Hydrology, Water supplies, Salinity, Wells, Irrigation systems, Drainage, Maps, *New Mexico

The results of analysis of water samples from wells and springs show that in the Roswell basin saline-water encroachment in the San Andres limestone, of Permian age, is a real or potential threat to ground-water supplies in four areas. Owing to increased precipitation in 1957 and 1958, saline-water encroachment was halted temporarily in the original study area in 1958, but by March 1959, because of deficient precipitation and consequent heavy pumping of wells, encroachment had resumed. The mineral content of water from artesian wells in the northern extension of the area is increasing slowly. Seasonal fluctuation of chloride content generally is on the order of 100 ppm.

Order from GPO $0.20 as
I 19.3:1162-C

Geological Survey, Washington, D. C.
SELENIUM IN STONE OXIDIZED SANDSTONE-TYPE URANIUM DEPOSITS. CONTRIBUTIONS TO ECONOMIC GEOLOGY, by D. F. Davidson. 1963, 37p 32refs
Geological Survey bulletin 1162-C

DESCRIPTORS: *Geochemistry, *Selenium, *Uranium, Sandstone, Ores (Metal sources), *Economic geology.

Studies of selenium and other trace metals in samples from some oxidized sandstone-type uranium deposits in New Mexico, Oklahoma, Pennsylvania, South Dakota, Texas, and Wyoming demonstrate that concentrations of as much as 0.1 percent selenium are not uncommon in the immediate vicinity of uranium concentrations. The work also has demonstrated that selenium contents of the uranium ores of these deposits, or of the highly seleniferous material associated with the ores, are not correlatable with the contents of any other constitutents of the ores or concentrations for which analyses have been made, although many of the metals of the deposits were probably derived from the same source, and concentrated together in the deposits.

Order from GPO $0.75 as
I 19.16:430

Geological Survey, Washington, D. C.
SILURIAN CORALS FROM MAINE AND QUEBEC. A. SILURIAN CORALS FROM THE MOOSE RIVER SYNCLINORIUM, MAINE. B. SILURIAN RUGOSE CORALS FROM THE LAKE TEMISCOUATA AREA, QUEBEC. C. A NEW KODONOPHYLLUM AND ASSOCIATED RUGOSE CORALS FROM THE LAKE MATAPEDIA AREA, QUEBEC, by Erwin C. Stumm and William A. Oliver, Jr. 66p 105refs
Geological Survey Professional Paper 430

DESCRIPTORS: *Paleontology, *Limestone, *Stratigraphy, *Maine, *Quebec, Rock (Geology), Geology.

Order from GPO $3.50 as
I 19.16:323

Geological Survey, Washington, D. C.
STRATIGRAPHY AND PALEONTOLOGY OF THE UPPERMOST PENNSYLVANIAN AND LOWERMOST PERMIAN ROCKS IN KANSAS, by Melville R. Mudge and Ellis L. Yochelson. 1962, 230p 209refs
Geological Survey Professional Paper 323

DESCRIPTORS: *Stratigraphy, *Paleontology, *Kansas, Sedimentation, Paleoecology, Rock (Geology), Foraminifera, Geological survey

This study of the uppermost part of the Pennsylvanian sequence and the lower part of the Permian sequence of rocks in Kansas has been made to describe the several geologic units and to investigate the placement of the systemic boundary. In describing the stratigraphy of the geologic units from the Dover limestone member of the Stotler limestone (upper Pennsylvanian) up to and including the Beattie limestone (lower Permian) particular attention has been given to the lithologic and paleontologic characteristics of each bed as it is traced southward across the State.

PB 163 713 OTS $2.60

Hudson Labs., Columbia U., Dobbs Ferry, N. Y.
AN ESTIMATE OF TURBULENT VELOCITIES IN THE OCEAN. Technical rept. no. 67, by T. E. Pochapsky. 1 Mar 56, 26p 16refs
Contract N6onr-27135
Rept. no. CU-87-59-ONR-271-Phys; AD-214 881

DESCRIPTORS: Oceans, *Ocean currents, *Turbulence, Motion, Velocity, Energy, Shear stresses, Boundary layer, Thermodynamics, Oceanology.

Past eddy diffusion measurements suggests that turbulent velocity fluctuations occur in the deep ocean. An attempt was made to determine the magnitude and scale of the fluctuations from estimates of shear velocities in the stably stratified ocean. The rate at which the kinetic energy of these fluctuations is converted into heat by viscosity is compared with an estimate of the rate at which kinetic energy is supplied to the water by forces acting on the boundaries of the ocean. An order of magnitude estimate of turbulent fluctuations was obtained which is useful in designing experiments for turbulence measurements at sea. Results show that vertical velocity fluctuations of less than 0.2 cm sec^{-1} can be expected in the deep ocean and that characteristic fluctuating vertical displacements would be about 50 cm. Corresponding magnitudes for the horizontal fluctuations are 2 cm sec^{-1} and 5 km. (Author)

TID-18415 OTS $6.60

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
DYE DIFFUSION EXPERIMENTS IN THE NEW YORK BIGHT, by M. Costin, P. Davis, R. Gerard, and B. Katz. Feb 63, 61p 10refs
Contract AT(30-1)2663.
CU-2-63

TID-18389 OTS $3.60

Woods Hole Oceanographic Institution Mass.
RADIOELEMENT STUDIES IN THE OCEANS. INCLUDES APPENDICES: GENERAL SUMMARY OF PROGRESS, 1962-63. FISSION PRODUCT CONCENTRATIONS IN CHUKCHI SEA WATER. ATLANTIC WEATHER STATION OBSERVATIONS. VERTICAL DISTRIBUTION OF FALLOUT RADIONUCLIDES IN THE ATLANTIC OCEAN. LITHIUM IN THE MARINE BIOSPHERE. 1963, 38p
Contract AT(30-1)2174

Order from GPO $0.25 as C 13.46:169

Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.
PROFILES OF ELECTRON DENSITY OVER THE MAGNETIC EQUATOR OBTAINED USING THE INCOHERENT SCATTER TECHNIQUE, by K. L. Bowles. 16 Mar 63, 31p 2refs
Technical note 169; NASA N63-11980

DESCRIPTORS: *Electron density, *Terrestrial magnetism, *Incoherent scattering, Ionosphere, Radar, Measurement, Electromagnetic waves, Propagation.

The technique of electron density measurement by incoherent scatter, using a high powered radar, has now been thoroughly explored in the literature. A representative bibliography on the subject, as well as a summary of experimental aspects, current early in 1962, has been given by Bowles, Ochs, and Green [1962]. The object of this note is to present a number of profiles obtained using incoherent scatter near Lima, Peru.

NASA N63-11762 OTS $10.50

[Stanford Electronics Labs.] Stanford U., Calif.
IONOSPHERIC ELECTRON CONTENT AND VARIATIONS MEASURED BY DOPPLER SHIFTS IN SATELLITE TRANMISSIONS. Technical report no. 2, by Fernando de Mendonca. 25 Oct 61, 138p 23refs
Grant NsG-30-60
Supersedes NASA N62-10073

ENGINEERING

NASA N63-21345 OTS $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ANALYSIS OF THE DYNAMIC TESTS OF THE STRETCH YO-YO DE-SPIN SYSTEM, by William R. Mentzer. Sep 63, 25p 3refs
Technical note D-1902

NASA N63-21325 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
LITHIUM-BOILING POTASSIUM REFRACTORY METAL LOOP FACILITY, by J. P. Davis, G. M. Kikin, W. M. Phillips, and L. S. Wolfson. 31 Aug 63, 22p.
Contract NAS7-100
Technical rept. no. 32-508; NASA CR-51236

NASA N63-18043 OTS $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN INVESTIGATION OF THE EFFECT OF TARGET TEMPERATURE ON PROJECTILE PENETRATION AND CRATERING, by William H. Kinard and C. H. Lambert, Jr. 28 Jul 58, 19p 4refs
Research memo no. RM-L58E14

UCRL-7221 OTS $1.60

Lawrence Radiation Lab., U. of California, Livermore.
HYDRODYNAMIC PRESSURE MEASUREMENT IN GRANITE NEAR AN UNDERGROUND NUCLEAR EXPLOSION, by D. B. Lombard and D. V. Power
14 Mar 63, 12p 7refs
Contract W7405-eng-48

PB 163 793 OTS $12.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
STUDY AND ANALYSIS OF DAMAGE BY TYPHOON KAREN ON GUAM, by R. M. Webb, J. T. OBrien, and E. J. Beck, Jr. 29 Mar 63, 171p 39refs
Technical note 497

DESCRIPTORS: *Tropical cyclones, *Storms, *Disasters, Damage, *Pacific Islands, Structures, Harbors, Piers, Military facilities, Water supplies, Communication systems, Analysis.

An engineering study was made of the effects of Typhoon Karen, which struck the island of Guam on 11 November 1962, with sustained winds estimated up to 150 knots and gusts to 176 knots. The assessments of damage and the recommendations in this report are based on one-site observations in the aftermath of the storm by a team of NCEL engineers, on interviews with Public Works Center personnel of Guam, and on reports by other observers. Recommendations, proposed research and development, and suggested new criteria are detailed.

PNE-108F OTS $2.00

Sandia Corp., Albuquerque, N. Mex.
PARTICLE MOTION NEAR A NUCLEAR DETONATION IN HALITE. Final rept. on Proj. GNOME, by W. D. Weart. Feb 63, 80p 12refs

SCR-583 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
RELIABILITY ASSURANCE FOR CUSTOM TESTERS, by B. O. Allen and W. W. Westman. Jan 63, 12p
Contract AT(29-1)789

SCR-582 OTS $1.50

Sandia Corp., Albuquerque, N. Mex.
RELIABLE SYSTEMS VERSUS AUTOMATIC TESTING, by Alan D. Swain. Jan 63, 12p 39refs
Contract AT(29-1)789

SCR-611 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
SURVEYING AND EVALUATING SUPPLIER QUALITY SYSTEMS, by David L. Field. May 63, 20p 7refs
Contract AT(29-1)789

TID-18502 OTS $3.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. Feb-Mar 63. 40p
Contract AT(29-2)1051

Aeronautical Engineering

PB 163 722 OTS $21.00

[Aerospace Medical Research Labs. (6570th) Aerospace Medical Div.] Wright-Patterson AFB, Ohio.
HANDBOOK OF LIQUID OXYGEN SYSTEMS. VOLUME I. AIRCRAFT LIQUID OXYGEN EQUIPMENT, by Clyde G. Roach and Betty M. Chin. Nov 56, 383p
WADC Technical rept. 56-260, Vol. I; AD-110 533

DESCRIPTORS: *Aircraft equipment, *Liquefied gases, *Oxygen, Design, Tests, *Handbooks.

A brief history of the work of the Air Force with oxygen covering the years from 1921 to the present is presented. Liquid oxygen and gaseous systems are compared, giving the advantages and disadvantages of each. Appended to the report are a number of previously published reports, together comprising a survey of the field and covering the problem from several angles. (Author)

PB 163 723 OTS $14.00

[Aerospace Medical Research Labs. (6570th), Aerospace Medical Div.] Wright-Patterson AFB, Ohio.
HANDBOOK OF LIQUID OXYGEN SYSTEMS. VOLUME II. GROUND EQUIPMENT FOR AIRCRAFT LIQUID OXYGEN SYSTEMS, by Clyde G. Roach, Mark A. Moon, and Betty N. Chin. Nov 56, 209p
WADC Technical rept. 56-260, Vol. II; AD-110 534

DESCRIPTORS: *Aircraft equipment, Ground support equipment, Design, Tests, *Liquefied gases, *Oxygen, Handling, Storage, Evaporation, *Handbooks.

A brief discussion of the precautions in the handling and storage of liquid oxygen is presented. Evaporation losses of liquid oxygen storage tanks of various sizes are also included. Appendices to the report are a number of previously published specifications covering the oxygen generating equipment, liquid oxygen storage tanks, and allied equipment. (Author)
(See also PB 163 722)

PB 163 819 OTS $1.60

Battelle Memorial Inst., Columbus, Ohio.
FORMAL DEFINITIONS OF REALIABILITY. Special rept. by D. E. Debeau, G. Kuhn, and W. L. Swager. 20 May 57, 16p
Contract AF 33(616)3344
AD-133 094

DESCRIPTORS: *Reliability, Propellers, Hazards, Control systems.

This report was incorrectly announced as PB 163 664

AD-400 470 OTS $8.60

Engelhard Industries, Inc., East Newark, N. J.
APPLIED RESEARCH, FABRICATION AND TESTING OF 2300°F THERMOCOUPLE FOR AIR-BREATHING PROPULSION SYSTEMS. Final rept. by Herbert J. Greenberg and Edward D. Zysk. Jan 63, 95p 29refs
Contract AF 33(616)7825
ASD-TDR-62-891

DESCRIPTORS: *Temperature sensitive elements, *Thermocouples, *Gold alloys, *Palladium alloys, *Platinum alloys, *Iridium alloys, Stability, Thermal stresses, Mechanical properties, *Jet engines, *Exhaust gases.

Development work on two thermocouple systems for use in aircraft jet engines to temperatures of 2300°F is reported. The two couples involved are the palladium vs, platinum 15% iridium previously investigated, and Platinel 2, a propietary material produced by Engelhard Industries, Inc. Reliability of the latter thermocouple in the jet-engine environment is shown. Fabrication techniques for manufacture of four basic termocouple geometries as well as performance data for same are presented. (Author)

PB 163 718 OTS $1.10

Engineering Div., Air Materiel Command, Wright-Patterson AFB, Ohio.
THE CENTER OF GRAVITY OF A FULLY LOADED F-85 EJECTION SEAT IN THE EJECTION POSITION, by H. T. E. Hertzberg and Gilbert S. Daniels.
14 Mar 50, 6p
Serial no. MCREXD-45341-4-5

DESCRIPTORS: *Aircraft equipment, Aircraft seats, *Ejection seats, Gravity, Tests, Pilots, Jet fighters.

The c.g. of an F-86a Ejection Seat has been measured by suspension in two positions under full load. It has been shown that the c.g. varies for each individual according to size, weight, and body build, and also for the position of the subject on the seat. Thus the c.g. of an individual may be thought of as an area rather than a point. (Author)

NASA N63-17993 OTS $1.60

Flight Research Center, National Aeronautics and Space Administration, Edwards, California.
REVIEW OF TECHNIQUES APPLICABLE TO THE RECOVERY OF LIFTING HYPERVELOCITY VEHICLES, by Joseph Weil and Gene J. Matrange. Sep 60, declassified 12 Jun 63. 17p 3refs
Technical memo no. X-334

AD-294 387 OTS $3.60

National Bureau of Standards, Washington, D. C.
THERMOELECTRIC AND MECHANICAL STABILITY OF PLATINEL II THERMOCOUPLES IN OXIDIZING ATMOSPHERES. Final rept. on Phase 2, Feb 61-Jul 62, on Advisory, Evaluating, and Testing Services for Development of Temperature Sensing Elements, by Paul D. Freeze and Lief O. Olsen. Nov 62, 37p 1ref
Contract AF 33(616)61-01
ASD-TDR-62-835

DESCRIPTORS: *Thermocouples, *Gold alloys, *Palladium alloys, *Platinum alloys, *Thermoelectricity, Mechanical properties, Stability, Thermal stresses, Oxidation, *Exhaust gases, *Temperature sensitive elements, *Jet engines, Turbopropeller jet engines.

The thermoelectric stability of Platinel II thermocouples was found to be quite good. In general, temperature indications changed no more than 3/4 percent from original calibrations after being heated in air at temperatures up to 2200°F for 1500 hours. However, when heated to 2300°F these changes were exceeded in about 100 hours. Increasing thermocouple wire diameter from 0.020 to 0.030 inch resulted in a marked increase in stability. Although there was some embrittlement no test thermocouple failed through heating to 2300°F for a period of 1500 hours. The temperature indications of engine-type Platinel II thermocouple probes changed only slightly after exposure to 600 cycles of severe thermal shocking from about 100°F to 2000°F. Six of the probes have survived 700 thermal shock cycles with no apparent damage. (Author)

Chemical Engineering

WAPD-T-1547 OTS $2.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
ANALYSIS OF GAS-LIQUID FLOW PATTERNS, by E. Quandt. Nov 62, 25p 18refs
Contract AT(11-1)GEN-14

NASA N63-21361 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DEVELOPMENT OF THE SURVEYOR GAS CHROMATOGRAPH, by W. F. Wilhite. 15 May 63, 19p 3refs
Contract NAS7-100
Technical rept. no. 32-425; NASA CR-51007

ORNL-TM-441 OTS $3.60

Oak Ridge National Lab., Tenn.
CHEMICAL TECHNOLOGY DIVISION, UNIT OPERATIONS SECTION MONTHLY PROGRESS REPORT, NOVEMBER 1962, by M. E. Whatley, P. A. Haas, R. W. Horton, A. D. Ryon, and J. C. Suddath.
3 May 63, 94p 5refs
Contract W7405-eng-26

Electrical and Electronic Engineering

Order from GPO $2.50 as
D 217.12:2230

Bureau of Naval Weapons, Washington, D. C.
WORKMANSHIP AND DESIGN PRACTICES FOR ELECTRONIC EQUIPMENT. 1 Dec 62, 465p 48refs
Rept. no. OP 2230, rev. 2, supersedes OP 2230, rev. 1

DESCRIPTORS: *Electronic equipment, *Instruction manuals, *Military requirements, Maintenance personnel, Safety, Maintenance, Construction, Design, Structural parts, Engineering, Protective treatments, Electrical equipment, Electric cables, Materials.

This pamphlet has been prepared as a guide for the design and construction of military electrical and electronic equipment. The information should not be construed as a specification, but as a guide in designing for reliable performance and ease of manufacture, inspection, operation, maintenance, and repair of equipments. This publication is intended primarily for engineers and technicians who must translate circuit designs or breadboard models into a product design, and those who must manufacture or inspect the final products in accordance with the applicable detail performance specifications. Because of the great variety of electronic equipments and the many factors which influence individual design considerations, only recommended basic practices of general application are included.

NASA N63-20891 OTS $2.75

Case Inst. of Tech., Cleveland, Ohio.
AN ANALYSIS OF A VORTEX TYPE MAGNETO-HYDRODYNAMIC INDUCTION GENERATOR, by L. L. Lengyel and Simon Ostrach. Sep 63, 136p. 24refs
Grant NsG-198-62
Technical note D-2006; supersedes NASA N63-12964

AD-402 830 OTS $7.60

General Electric Co., Syracuse, N. Y.
FIELD EFFECT TRIODES AND SPACE CHARGE LIMITED TRIODES. Quarterly rept. no. 2, 1 Sep-30 Nov 62, by J. M. Blank, W. Tantraporn, K. K. Reinhartz, and W. L. Willis. [1962] 71p 9refs
Contract DA 36-039-sc-90756

DESCRIPTORS: *Semiconductor devices, *Triodes, *Metal films, *Thin films, Dielectrics, Theory, *Vapor plating, *Cadmium compounds, Sulfides, Recrystallization

The possible conduction mechanisms for thin-film, field effect triodes are discussed. Experimental findings seem to rule out charge redistribution and substantiate the change in injection rate and trap emptying mechanism. The wire masking for source-drain gaps and CdS evaporation from a Drumheller source are described. Methods of depositing SiO to obtain both good adherance and isolation are given. Both ac and dc measurement for field effect triodes are discussed and characteristics of these devices tabulated. A modification of the theory for space charge limited triodes and a set of experimental conditions to obtain SCL action are presented. These conditions pertain to the film resistivity and current density in the CdS layer. The post deposition treatment of CdS films including heat treatment in Cd vapor and recrystallization is described.

AD-276 655 OTS $7.60

General Electric Co., Syracuse, N. Y.
SOLID STATE MICROELECTRONIC SYSTEMS PROGRAM. Quarterly rept. no. 3, 1 Feb-1 May 62, by R. Warr, L. Ragonese, and G. Danielson. [1962] 72p
Contract DA 36-039-sc-87466

DESCRIPTORS: *Semiconductor devices, *Microminiaturization (Electronics), *Electronic circuits, *Reliability (Electronics), Digital systems, *Band-pass filters

A discussion of the progress occurring during this period is given, which includes results of studies on power dissipation, reliability and adjustability. Studies have continued on the design technique for the minimum power dissipation design of the DCTL-NOR circuit. A description is given of a method for determining the minimum acceptable base current in the DCTL-NOR circuit. Procedures are presented that represent solutions to the problem of selecting optimum component tolerances that maximizes system reliability within the constraints of specifications such as frequency of operation, load capability, operating temperature and packing density. A description is given of the Laboratory implementation of digital filters and measurement of their transfer functions. The transfer functions were evaluated at 1600 cps where operation as a tone selector might take place. (Author)

NASA N63-16154 OTS $5.60

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
APOLLO GUIDANCE AND NAVIGATION. RELIABILITY HANDBOOK FOR ELECTRONIC DESIGNERS, by G. W. Mayo, Jr. and E. T. Driscoll. Aug 62, 60p
Contract NAS9-153
Report no. R-368

NASA N63-21313 OTS $7.60

Redel, Inc., Anaheim, Calif.
EVALUATION OF CRITICAL PROPERTIES OF SELECTED MATERIALS FOR ELECTRONIC PACKAGING PURPOSES. Final rept., 5 Mar 62-30 Jun 62, by Jay W. DeDapper. 1 Aug 62, 79p.
Contract NAS7-100
Report no. RML-4; NASA CR-51244

SCTM-288-62(14) OTS $5.60

Sandia Corp., Albuquerque, N. Mex.
MUTUAL AND SELF-IMPEDANCE OF ELECTRICALLY SHORT ANTENNAS, by D. H. Denton. Sep 62, 59p
Contract AT(29-1)789

Ordnance, Missiles, and Satellite Vehicles

PB 163 702 OTS $1.60

[Aerospace Medical Research Labs. (6570th) Space Medical Div.] Wright-Patterson AFB, Ohio.
CONSIDERATIONS IN PREDICTION OF MAINTAINABILITY. Rept. on Human Factors in Advanced Systems, by Robert G. Lowder. Nov 59, 12p 6refs
WADC Technical note 59-378; AD-233 848

DESCRIPTORS: *Weapon systems, *Maintenance, Mathematical prediction, Maintenance personnel, Malfunctions, Maintenance tools, *Human engineering.

A major concern of the Air Force is the growing difficulty of maintaining increasingly complex weapon systems. This report is intended to illuminate this situation by suggesting a method of predicting how much maintenance will be required by a system before it goes into production. If maintenance requirements will be excessive, changes in the system can be made before the hardware stage is reached. Recommendations are made for the construction of a predicting instrument. (Author)

NASA N63-21344 OTS $1.00

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A CONTRIBUTION TO THE THEORY OF CRITICAL INCLINATION OF CLOSE EARTH SATELLITES, by Shinko Aoki. Sep 63, 34p 13refs
Technical note D-1858

NASA N63-20247 OTS $1.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
EXPRESSING MASS UNBALANCE, by N. C. Schaller and J. Mayne Lewallen. May 61, 13p
Report no. 321.3(JL)10; NASA TM-X-50175

NASA N63-21270 OTS $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A METHOD TO OPTIMIZE THE SOLAR CELL POWER SUPPLY FOR INTERPLANETARY SPACECRAFT, by Grady B. Nichols. Sep 63, 20p
Technical note D-1846

NASA N63-21120 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
JPL 25-FOOT SPACE SIMULATOR SOLAR PERFORMANCE AND MARINER TEST RESULTS COMPARED TO FLIGHT DATA, by W. R. Howard. 24 Apr 63, 24p
Contract NAS7-100
Technical memo no. 33-137; NASA CR-50997

Presented at the NASA Conference on Solar Simulation Research and Technology, Washington, Feb 27-28, 1963.

NASA N63-21350 OTS $6.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-22, VOLUME III, FOR THE PERIOD MAY 1, 1963 TO JUNE 30, 1963. THE DEEP SPACE INSTRUMENTATION FACILITY. 31 Jul 63, 61p 5refs
Contract NAS7-100
NASA CR-51099

NASA N63-18904 OTS $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
MATERIALS AND STRUCTURES FOR MANNED SPACE STATIONS, by Robert S. Osborne, Clarence O. Keffer, and George Look. [1962] 14p 6refs

Order from GPO $0.35 as
NAS 1.12:115

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
METHOD FOR APPROXIMATING THE VACUUM MOTIONS OF SPINNING SYMMETRICAL BODIES WITH NONCONSTANT SPIN RATES, by C. William Martz. 1961, 20p 6refs
Technical rept. R-115; NASA N63-14781

DESCRIPTORS: *Space flight, Motion, Spin, Vacuum apparatus, *Euler's angles, *Flight paths, Attitude control systems, *Trajectories, Oscillation, Damping.

The analysis includes nonconstant spin rates and inertias and considers the effects of time-varying thrust misalinements, mass unbalance, and jet damping. The method was developed for bodies having small transverse angular velocities. Results are presented in the form of equations for space-referenced Euler angles, flight-path angles, body-referenced attitude rates, and earth-referenced vehicle-trajectory coordinates. Also, equations for maximum wobble have been derived for certain input conditions. Comparisons with numerical solutions are included for two sample problems. (Author)

NASA N63-21893 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SIMULATOR STUDY OF A SATELLITE ATTITUDE CONTROL SYSTEM USING INERTIA WHEELS AND A MAGNET, by James J. Adams, W. E. Howell, and Hugh P. Bergeron. Oct 63, 18p 8refs
Technical note D-1969

Order from GPO $0.30 as
NAS 1.12:129

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A THEORETICAL STUDY OF THE TORQUES INDUCED BY A MAGNETIC FIELD ON ROTATING CYLINDERS AND SPINNING THIN-WALL CONES, CONE FRUSTUMS, AND GENERAL BODY OF REVOLUTION, by G. Louis Smith. 1962, 16p 7refs
Technical rept. R-129; AD-272 613; NASA N63-12596

DESCRIPTORS: *Satellites (Artificial), *Cylindrical bodies, *Conical bodies, *Bodies of revolution, Motion, Spin, Damping, Torque, *Magnetic fields.

The electromagnetic field equations are applied to nonferromagnetic conducting thin-wall cylinders, cones, and cone frustums, with extension to the general thin-wall body of revolution slowly spinning in a homogeneous magnetic field, in order to calculate the induced eddy currents and resulting torques. The solutions to these cases have direct application in calculating the magnetic torques tending to damp the rotation of spinning and tumbling satellites. (Author)

NASA N63-21102 OTS $6.00

Martin-Marietta Corp., Baltimore, Md.
SPACE FLIGHT HANDBOOKS. VOLUME I: ORBITAL FLIGHT HANDBOOK. PART 2. MISSION SEQUENCE PROBLEMS, by George Townsend and Donald Kraft. 1963, 443p. refs
Contract NAS8-5031
NASA SP-33, pt. 2

NASA N63-21103 OTS $5.00

Martin-Marietta Corp., Baltimore, Md.
SPACE FLIGHT HANDBOOKS. VOLUME I: ORBITAL FLIGHT HANDBOOK.PART 3. REQUIREMENTS, by George Townsend and Donald Kraft. 1963, 384p refs
Contract NAS8-5031
NASA SP-33, pt. 3

NASA N63-21104 OTS $2.75

Martin-Marietta Corp., Baltimore, Md.
SPACE FLIGHT HANDBOOKS. VOLUME 2: LUNAR FLIGHT HANDBOOK. PART 1. BACKGROUND MATERIAL, by Fred Martikan and Frank Santora. 1963, 143p. refs
Contract NAS8-5031
NASA SP-34, pt. 1

NASA N63-21105 OTS $6.00

Martin-Marietta Corp., Baltimore, Md.
SPACE FLIGHT HANDBOOKS. VOLUME 2: LUNAR FLIGHT HANDBOOK. PART 2. LUNAR MISSION PHASES, by Fred Martikan and Frank Santora. 1963, 444p. refs
Contract NAS8-5031
NASA SP-34, pt. 2

NASA N63-21106 OTS $3.00

Martin-Marietta Corp., Baltimore, Md.
SPACE FLIGHT HANDBOOKS. VOLUME 2: LUNAR FLIGHT HANDBOOK. PART 3. MISSION PLANNING, by Fred Martikan and Frank Santora. 1963, 156p. refs
Contract NAS8-5031
NASA SP-34, pt. 3

Sanitation and Safety Engineering

TID-3552 (Rev. 2) OTS $0.50

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
SHIPPING AND STORAGE OF RADIOACTIVE MATERIALS. A literature search, comp. by Theodore F. Davis. Aug 63, 26p. 308 refs.

HW-SA-2276 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
A TEST PROCEDURE FOR EVALUATING RESPIRATORY PROTECTIVE DEVICES, by D. E. Wisehart. 14 Nov 61, 11p
Contract AT(45-1)1350

ORNL-TM-507 OTS $2.60

Oak Ridge National Lab., Tenn.
RADIATION SAFETY AND CONTROL AT THE OAK RIDGE NATIONAL LABORATORY, 1960-1962, by F. R. Bruce. 5 Apr 63, 26p
Contract W7405-eng-26

FOOD, HANDLING, AND PACKAGING EQUIPMENT

TID-17557 OTS $1.00

Fish and Wildlife Service, Seattle, Wash.
RADIATION OF FISH, ANNUAL REPORT, OCTOBER 1961-SEPTEMBER 1962. PART I. APPLICATION OF RADIATION-PASTEURIZATION PROCESSES TO PACIFIC CRAB AND FLOUNDER. PART II. EFFECTS OF IONIZING RADIATION ON LIPIDS OF FISH, by David Miyauchi, Melvin Eklund, and Virginia F. Stout. 11 Oct 62, 42p 10refs

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Order from GPO $0.15 as
C 41.2:V55

Business and Defense Services Administration, Dept. of Commerce, Washington, D. C.
THE AUTOMATIC VENDING MACHINE INDUSTRY; ITS GROWTH AND DEVELOPMENT, by Charles F. Daoust, Angelina P. McEntee, and James L. Oliver. 1962, 25p 5refs

DESCRIPTORS: *Vending machines, Industrial production, Distribution, Commerce

Automatic vending machines, providing large segments of the public with goods and services at all hours of the day, play an important role in the American distribution system. They have become a necessity rather than a convenience, and in recent years their industrial and commercial uses have broadened. For these reasons, the prospects of automatic vending machine manufacturers and route operators are bright. These prospects are examined in this study, which also provides basic statistics and background data.

PB 163 708 OTS $1.10

California U., Los Angeles.
NOTES ON SOME SCHEDULING PROBLEMS. Rept. on Management Sciences Research Project, by James R. Jackson. 1 Oct 54, 7p
Contract Nonr-233(02)
Research rept. no. 35

DESCRIPTORS: *Management engineering, *Scheduling, *Industrial production, Machines, Transportation

A theorem is developed which is a slight generalization of some of the work of Selmer Johnson ("Optimal Two- and Three-Stage Production Schedules with Setup Times Included," RAND Publication P-402, revised Oct 20, 1953). It is pointed out that Johnson's results can be obtained from this theorem.

Engines and Propulsion Systems

TID-7653(Pt. 1) OTS $3.00

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
PROCEEDINGS OF NUCLEAR PROPULSION CONFERENCE, NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIFORNIA, AUGUST 15-17. 1962. Jul 63, 226p 101refs

TID-15222 OTS $3.60

Geoscience, Ltd., Solana Beach, Calif.
HIGH ACCELERATION FIELD HEAT TRANSFER FOR AUXILIARY SPACE NUCLEAR POWER SYSTEMS. Quarterly technical rept. 1 Sep-30 Nov 61. by H. F. Poppendiek, N. D. Greene, and H. G. Hughes. 31p 17refs
Contract AT(04-3)409

TID-17707 OTS $4.60

Geoscience Ltd., San Diego, Calif.
HIGH ACCELERATION FIELD HEAT TRANSFER FOR AUXILIARY SPACE NUCLEAR POWER SYSTEMS. Quarterly technical rept. 1 Sep-31 Nov 62 by H. F. Poppendiek, N. D. Greene, F. R. MacDonald and H. R. Wright. 42p 9refs
Contract AT(04-3)409.
GLR-11

TID-18474 OTS $1.60

Geoscience Ltd., San Diego, Calif.
HIGH ACCELERATION FIELD HEAT TRANSFER FOR AUXILIARY SPACE NUCLEAR POWER SYSTEMS. Quarterly technical rept., 1 Dec 62-28 Feb 63 by H. F. Poppendiek, N. D. Greene, F. R. MacDonald, and R. K. Livett. 17p
Contract AT(04-3)409

LADC-5458 OTS $1.60

Los Alamos Scientific Lab., N. Mex.
CRYOGENIC TECHNOLOGY IN THE NUCLEAR ROCKET PROGRAM, by E. F. Hammel. 62, 14p 1ref
Contract W7405-eng-36

NASA N63-21625 OTS $2.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
ERROR ANALYSIS OF PROPULSION SYSTEM PARAMETER EVALUATION FOR SATURN SA-1, by C. R. Fulmer. 20 Apr 62, 28p 2refs
MTP-AERO-62-37; NASA TM X-50286

MATERIALS

TID-18246 OTS $1.10

Allis-Chalmers Mfg. Co., Washington, D. C.
SHEAR TEST OF AGOT GRAPHITE, by R. Michel. 17 Feb 60, 8p 1ref
Contract AT(10-1)925

PB 163 795 OTS $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
CORRELATION OF AIR OVEN AND AIR-GLYCERINE TYPE CURING OF VINYL FILMS, by Richard E. Norman. 15 Aug 57, 17p 2refs
Technical rept. no. 5739; AD-140 292

DESCRIPTORS: *Plastic films, *Vinyl plastics, Aging (Materials), Physical properties, Driers (Apparatus), Air, Glycerols.

The purpose of this investigation is to present a method of correlating the air-glycerine bath, the Test Section circulating air oven, and the Studio circulating air oven of APRL. Curves of physical properties plotted versus cure time at specific cure temperatures enable one to observe approximate time lags between air ovens and glycerine bath when satisfactory or equivalent physicals are desired. Films cured in the Test Section oven gave lower physical properties than films cured in the Studio oven or glycerine bath. (Author)

PB 163 721 OTS $13.00

DeBell and Richardson, Inc., Hazardville, Conn.
MATERIALS STUDY - HIGH STRENGTH, HIGH MODULUS FILAMENT WOUND DEEP SUBMERGENCE STRUCTURES. Final rept. by William J. Eakins.
15 Feb 63, 188p 28refs
Contract NObs-84672

DESCRIPTORS: *Submarine hulls, *Filament wound construction, *Composite materials, *Glass textiles, Surface properties, *Binders, *Silanes, *Finishes and finishing, *Epoxy plastics, Tensile properties, Corrosive liquids, Sea water

The purpose of this study is to use high modulus, continuous glass strand to develop an optimum combination of finish and resin technique of preparation that will give superior physical and environmental properties to filament wound structures for deep submergence vehicles. The target objective is a material that has a compressive strength of 150,000 psi at a modulus of 10.0×10^6 psi and a density of 0.08 lbs/cu in. (See also AD-275 788)

HW-75654 OTS $3.60

Hanford Atomic Products Operation, Richland, Wash.
SONIC DETERMINATION OF ELASTICS CONSTANTS IN GRAPHITE, by D. E. Colley. 13 Jul 62, 37p 3refs
Contract AT(45-1)1350

AD-403 727 OTS $9.10

Hughes Tool Co., Culver City, Calif.
FUNDAMENTAL STUDIES OF COMPRESSIBILITY OF POWDERS. Final rept. Mar 61-Dec 62, by I. Shapiro.
Mar 63, 104p 39refs
Contract AF 33(616)8006, Subcontract to Universal Chemical Systems, Inc.
Rept. no. HTC-62-64; ASD-TDR-63-147

DESCRIPTORS: *Powders, Compressive properties, *Powder metals, *Magnesium, *Tungsten, *Ceramic materials, *Thorium compounds, Oxides, *Silicon compounds, Dioxides, *Molybdenum compounds, Sulfides, *Tantalum compounds, Carbides, Particle size, Density, Deformation

The compressibility of a number of powders of different physical characteristics was measured at ambient temperature. The progress of the compaction behavior of the powders was followed by photomicroscopy—this technique permitted observing changes occurring during compression. The difference between plastic deformation of metals, such as magnesium, and the fragmentation of ceramics, such as thoria, could be clearly demonstrated. The compressibility of molybdenum disulfide, a material commonly used as a lubricant, indicated a high degree of "plastic" quality as well as some fragmentation. Mixtures of molybdenum disulfide with ceramics reslulted in both types of compaction. The applicability of several formulas relating porosity or density of compacts with pressure is discussed.

AD-268 248 OTS $3.60

Institute of Rubber Research, U. of Akron, Ohio.
MOLECULAR STRUCTURE AND PHYSICAL BEHAVIOR OF POLYMERS. Rept. for 1 Feb 60-1 Feb 61, on Nonmetallic and Composite Materials, by M. Morton, F. Bueche, S. D. Gadkary, and T. E. Helminiak.
Jun 61, 38p
Contract AF 33(616)6965
ASD Technical rept. 61-16

DESCRIPTORS: *Polymers, *Styrene plastics, Polymerization, Molecular weight, Molecular structure, *Phenolic plastics, *Azoles, *Rubber, *Fillers, *Carbon black, *Elastomers, *Butadienes, Mechanical properties

Linear polystyrenes with reactive end groups and having $M_w/M_n < 1.10$ have been prepared. These molecules have been linked into star-type molecules by use of silicon tetrachloride as linking agent. The resultant branched polymer is found to consist of both tri- and tetra-branched polymer stars. A small amount of polymer having twice the original molecular weight may be present. Some linear primary polymer also remains. These species have been fractionated into well defined groups so that tetra-branched and tri-branched stars were obtained. Preliminary measurements of the intrinsic viscosity in toluene indicate that the ratio of the intrinsic viscosity of tetra-star molecules to that of a linear polymer of the same molecular weight is about 0.89, whereas for tri-star molecules it is 0.94. Calculations are given which show how the molecular weight distribution of the linear molecules influences the molecular weight distribution of the branched polymer. The weight-average molecular weight of a new polymer, PBI-1, poly-m-phenylene-bibenzimidazole, was determined, and an estimate of its size in solution was made. It was found to be an extremely stiff, extended chain. Creep measurements have been made on carbon black filled SBR, styrene-butadiene rubber, at very high stresses.

NASA N63-21365 OTS $4.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
A STUDY OF THE OUTGASSING AND EVAPORATION PRODUCTS OF SOME MATERIALS UPON EXPOSURE TO REDUCED PRESSURE, by S. V. Caruso and W. C. Looney. 2 Apr 62, 48p
MTP-P&VE-M-62-7; NASA TM X-50413

Ceramics and Refractories

NAA-SR-MEMO-7861 OTS $1.10

Atomics International, Canoga Park, Calif.
HIGH TEMPERATURE PHASE TRANSITION IN BERYLLIUM OXIDE, by Stanley B. Austerman.
31 Oct 62, 10p 7refs
Contract AT(11-1)GEN-8.

BBC-117 OTS $1.60

Brush Beryllium Co., Cleveland, Ohio.
RESEARCH ON MODIFIED BERYLLIDES AS HIGH-TEMPERATURE NUCLEAR MATERIALS. Quarterly progress rept. 1 Sep-30 Nov 62, by R. M. Paine, A. J. Stonehouse, and W. W. Beaver. 31 Dec 62, 16p 2refs
Contract AT(33-3)20

GA-3783 OTS $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
ADVANCED BERYLLIUM OXIDE CONCEPTS. Progress rept. 17 Jan 63, 40p
Contract AT(04-3)187

TID-18434 OTS $2.60

Massachusetts Inst. of Tech., Cambridge.
BASIC RESEARCH IN CERAMICS AND NONCRYSTALLINE SYSTEMS, by W. D. Kingery, R. L. Coble, A. R. Cooper, Jr., and T. R. Clevenger, Jr.
30 Mar 63, 21p 21refs
Contract AT(30-1)2574

AD-416 036 OTS $3.60

Midwest Research Inst., Kansas City, Mo.
A STUDY OF THE PHYSICAL BASIS OF THE MECHANICAL PROPERTIES OF CERAMICS. Summary rept. 18 Apr 62-17 Apr 63, on Refractory Inorganic Nonmetallic Materials, by Gordon E. Gross. Aug 63, 34p 74refs
Contract AF 33(657)8572
ASD-TDR-63-605, Part 1.

DESCRIPTORS: *Ceramic materials, Mechanical properties, *Dielectrics, Surface properties, Fracture (Mechanics), *Germanium, Plasticity, Absorption spectrum, *Beryllium, Hall effect, *Crystal lattices, Brittleness, Ductility, Scattering, Bibliographies

A literature survey of the properties of ceramics, both classical and more recent solid theory, is presented. A better understanding of the ceramic properties as related to their electron-lattice structure was gained by correlating the mechanical properties of brittleness and ductility with the electronic and crystalline (lattice) properties of materials. To achieve the above, three goals were set: (1) To establish a physical basis for the brittleness and ductility of insulators (e.g., ceramics) and semi-metallic materials; (2) To develop an understanding of the role of surface energy in fracture of ceramics and other nonmetals; and (3) To reach some practical conclusions regarding the scatter in test values for strength of ceramic specimens. Experimental methods and results are given for surface energy and Hall coefficients measurements. (Author)

TID-18412 OTS $12.00

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
FUNDAMENTAL STUDIES IN HIGH TEMPERATURE MATERIALS PHENOMENA. SCOPE I. HIGH TEMPERATURE-PRESSURE PHYSICAL PROPERTY MEASUREMENTS. SCOPE II. ELECTRICAL RESISTIVITY MEASUREMENTS OF MATERIALS IN RELATION TO HIGH TEMPERATURE TRANSFORMATIONS. SCOPE III. TRANSFORMATIONS IN AB_2 INTERMETALLIC COMPOUNDS. Annual progress rept. 12 Mar 63, 162p 65refs
Contract AT(30-1)2581

Fuels, Lubricants, and Hydraulic Fluids

AD-285 002 OTS $1.60

Nonmetallic Materials Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
MICROBIOLOGICAL EXAMINATION OF JET FUEL-WATER SAMPLES RAMEY AND EGLIN AIR FORCE BASES. Rept. on Aviation Fuels, by Arthur V. Churchill, Jul 62, 15p 3refs
ASD-TDR-62-361

DESCRIPTORS: *Jet engine fuels, *Aviation fuels, *Corrosion, *Bacteria, Fuel tanks, Contamination.

An investigation was conducted to identify microorganisms permitting microbiological contamination and resulting corrosion of B-52 and KC-135 integral fuel tanks at Ramey and Eglin Air Force Bases. Of the microorganisms isolated, the most predominant groups found were the transparent bacterium and the iron-depositing bacterium. Sulfur-oxidizing bacterium was possibly present in a wet sludge sample from a corroded wing tank. The role of these predominant microorganisms on corrosion of aircraft fuel tanks should be further investigated. The corrosive activity of jet fuel-water sample from Bulk Storage Tank #55, Ramey AFB, was also investigated, as well as analyses of sludge samples from aircraft based at Ramey AFB. (Author)

AD-278 074 OTS $4.60

Nonmetallic Materials Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
A STATISTICAL ANALYSIS OF THE FRICTIONAL PERFORMANCE OF SOLID FILM LUBRICANTS. PART II: CERAMIC BONDED FILM IN AIR. Final rept., May 60-May 61, on Aviation Lubricants, by Martin R. Adams and Mary D. Lum. Mar 62, 45p 10refs
WADD Technical rept. 61-49, Pt. II; NASA N62-13875

DESCRIPTORS: *Lubricants, *Antiseize compounds, *Ceramic materials, Films, *Lead compounds, Sulfides, *Boron compounds, Oxides, Friction, Statistical analysis.

This report presents a statistical analysis of the performance of a ceramic bonded solid film lubricant. The ceramic bonded film, PbS/B_2O_3 in a six to one weight ratio of lubricant to binder, is of interest in the 700 to 1000°F temperature range. Experiments were conducted on the Hohman A-6 tester with two

loading shoes. The analysis of variance shows that, within the range of the variables studied, the main effects of bearing load and ambient temperature are significant, and that a response to a change in temperature depends on speed. The results are analyzed with an approximate and with an exact statistical method. The two methods lead to identical conclusions. (Author)

PB 163 710 OTS $13.00

Thiokol Chemical Corp., Elkton, Md.
A RESEARCH STUDY TO ADVANCE THE STATE-OF-THE-ART OF SOLID PROPELLANT GRAIN DESIGN. Interim summary rept. 3 May 59-31 Dec 60, by H. G. Jones. 17 Jan 61, 183p 7refs
Contract AF 33(616)6530
Rept. no. E217-60; AD-254 461

DESCRIPTORS: *Solid rocket propellants, *Rocket propellant grains, Design, Interior ballistics, Programming (Computers), Non-destructive testing.

GRAIN DESIGN: Specific grain evaluation computer program (sharp-pointed star designs and conical bi-propellant design); and generalized grain design computer program (grain geometry evaluation and ballistic performance evaluation). Structural Analysis Of Solid Propellant Grains: Nondestructive experimental technique for grain analysis (two dimensional photoelasticity, three dimensional photoelasticity, photostress study, and photostress studies on case-bonded grains); and analytical studies (pressure distribution across the interface of concentric elastic cylinders of different moduli of elasticity subjected to internal pressure, and two dimensional heat transfer with chemical reactions and variable thermal properties in irregular cylinders). (DDC abstract) (See also PB 163 711)

PB 163 711 OTS $8.10

Thiokol Chemical Corp., Elkton, Md.
RESEARCH STUDY TO ADVANCE THE STATE-OF-THE ART OF SOLID PROPELLANT GRAIN DESIGN. Quarterly progress rept. no. 5, 1 May-1 Aug 60, by H. G. Jones. 28 Oct 60, 81p 31refs
Contract AF 33(616)6530
Rept. no. E181-60; AD-249 589

DESCRIPTORS: *Solid rocket propellants, *Rocket propellant grains, Design, Interior ballistics, Programming (Computers), Graphic analysis.

A generalized, IBM 650 computer program for calculating the ballistic performance of internal burning, solid propellant engines is being developed. The program will not only compute theoretical burning surface area but will also account for the effects on engine performance of such variables as erosive burning, grain shape and nozzle efficiency. Thrust-time performance will be an output of the program. The over-all computer program is divided into two programs. The first program computes burning surface area as a function of distance burned. The second program will compute ballistic performance and use the surface areas calculated by the first program as part of its input data. An effort is being made to recognize and define the relationships that exist between propellant physical properties, grain geometry, and the geometry of the interior of the thrust chamber, and to apply these relationships to the science of solid propellant rocket design. PhotoStress tests are being conducted to determine grain strains experimentally. This consists of fabricating small models of rocket engine grains, coating the grains with bi-refringent plastic, exposing them to polarized light, subjecting them to various loads, and photographing the resultant strain patterns in the plastic grain coating. (Author)

MATHEMATICS

TID-15543 OTS $1.60

Argonne National Lab., Ill.
PROPAGATION OF APPROXIMATION ERRORS IN SPECTRA: THE GAS MODEL, by C. N. Kelber and K. S. Min. Feb 62, 17p 3refs
Contract W31-109-eng-38
UAC-6157

HW-SA-2405 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
IN-PLACE MEASUREMENT OF PERMEABILITY IN HETEROGENEOUS MEDIA. PART III. EXAMINATION OF A COMPUTATIONAL SCHEME, by R. William Nelson and A. E. Reisenauer. 15 Jan 61, 16p 6refs
Contract AT(45-1)1350

TID-13988 OTS $1.60

Los Alamos Scientific Lab., N. Mex.
AN INTERESTING EXAMPLE IN THE THEORY OF STABILITY OF FINITE-DIFFERENCE EQUATIONS, by Seymour V. Parter. 10 Oct 61, 20p 10refs
Contract W7405-eng-36
LADC-4977

ORNL-TM-430 (Suppl.) OTS $1.10

Oak Ridge National Lab., Tenn.
AN IBM-7090 SUBROUTINE FOR MAKING LINEAR GRAPHS USING THE CALCOMP PLOTTER, by D. K. Trubey and M. B. Emmett. 27 Feb 63, 4p 1ref
Contract W7405-eng-26

AD-278 268 OTS $3.60

RCA Service Co., Inc., Patrick AFB, Fla.
PHOTOGRAMMETRIC DATA REDUCTION ANALYSIS CALIBRATION OF A PRECISION COORDINATE COMPARATOR, by George H. Rosenfield. Jun 62, 35p 4refs
Contract AF 08(606)3413
RCA Mathematical Services TR-62-2; MTC-TDR-62-5; NASA N62-14938

DESCRIPTORS: *Optical instruments, *Calibration, Measurement, Errors, Screw threads, Rhythm, Least squares method, Harmonic analysis, *Film readers, Precision equipment, Photogrammetry.

The procedures for calibrating a screw type, precision coordinate comparator are described. The errors to be calibrated are: periodic screw error, scale error and secular screw error, curvature and

weave of the ways, and misperpendicularity of the axes. Periodic error is calibrated using a 2 mm scale graduated into 0.1 mm increments. The calibration model is formed by a least squares sine wave fit. Scale error and secular screw error are calibrated using a 240 mm calibrated scale graduated into 1 mm increments. The calibration model is formed by a least squares polynomial fit and a harmonic analysis. Curvature and weave of the ways are calibrated using a line divided into precision equal increments. The calibration model is formed using the principle of inversion, and a linear least square function fit and harmonic analysis. Misperpendicularity of the axes is calibrated using non-calibrated points on a plate. The calibration model is formed using the principle of inversion.

TID-18347 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
ESTIMATING MEANS AND STANDARD DEVIATIONS FROM PARTIAL DATA. AN EMPIRICAL CHECK ON LORD'S ITEM SAMPLING TECHNIQUE, by Lynnette B. Plumlee. Mar 63, 13p 4refs
Contract AT(29-1)789.

Computing Devices

NAA-SR-MEMO-7940 OTS $2.60

Atomics International, Canoga Park, Calif.
DSDE. A COMPUTER PROGRAM FOR CALCULATION OF MULTIGROUP THERMAL SCATTERING CROSS SECTIONS, by M. A. Boling and W. A. Rhoades. 6 Nov 62, 28p 6refs
Contract AT(11-1)GEN-8

TID-18284 OTS $6.60

Atomics International, Canoga Park, Calif.
TEMPEST II. A NEUTRON THERMALIZATION CODE, by R. H. Shudde and J. Dyer. Jun 62, 61p

BNL-6885 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
MIST. BUBBLE CHAMBER DATA REDUCTION PROGRAM, by Jerry M. Friedman. Feb 63, 28p
Contract AT(30-2)GEN-16

TID-18446 OTS $2.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
PROGRESS REPORT NO. 29 [ON COMPUTING AND MATHEMATICS] JULY 1, -DECEMBER 31, 1962, by Arthur Melmed. 21 Jan 63, 23p 8refs
Contract AT(30-1)1480

HW-SA-2388 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
IMPROVING COMPUTER PROGRAM-TESTING SERVICE, by E. C. Arbuckle and E. J. Saxberg. 11 Jan 62, 11p
Contract AT(45-1)1350

IDO-16856 OTS $2.25

Internuclear Co., Clayton, Mo.
MIST (MULTIGROUP INTERNUCLEAR SLAB TRANSPORT) by G. E. Putnam and D. M. Shapiro. 10 May 63, 103p
Contract AT(10-1)205, Subcontract with Phillips Petroleum Co.

NASA N63-21119 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FORTRAN SOURCE PROGRAM FOR RETENTION OF GAS-LIQUID CHROMATOGRAPHY MEASUREMENTS, by D. David Lawson and A. J. Havlik. 26 Mar 63, 13p 6refs
Contract NAS7-100
Technical memo no. 33-128; NASA CR-50996

KAPL-M-RPC-3 OTS $8.10
(Rev. 1)

Knolls Atomic Power Lab., Schenectady, N. Y.
FICS. A PROGRAM TO COMPUTE FEW-GROUP CONSTANTS WITHIN THE KARE DIFFUSION THEORY SYSTEM, by Donald E. Goodman. Jan 63, 85p 19refs
Contract W31-109-eng-52

KAPL-M-FDF-2 OTS $4.60

Knolls Atomic Power Lab., Schenectady, N. Y.
SWAKRAUM. A SPATIALLY DEPENDENT THERMAL SPECTRUM CODE FOR THE PHILCO-2000, by Francis D. Federighi. Nov 62, 49p 8refs
Contract W31-109-eng-52

KAPL-M-SR-2 OTS $7.60

Knolls Atomic Power Lab., Schenectady, N. Y.
TER4. REACTOR TRANSIENT ANALYSIS PROGRAM, by S. A. Ryan. Jan 63, 73p 1 ref
Contract W31-109-eng-52

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TIGER. TEMPERATURES FROM INTERNAL GENERATION RATES, by David L. Briggs. 1 Feb 63, 81p 3 refs

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Knolls Atomic Power Lab., Schenectady, N. Y.
USE OF DIFFUSION THEORY CODES TO PREDICT GAMMA HEATING, by Charles R. Greenhow, Gerhard O. Mueller, and Gerald E. Sabian. 1 Jan 63, 57p 15refs
Contract W31-109-eng-52.

ORNL-TM-553 OTS $1.60

Oak Ridge National Lab., Tenn.
AUTOMATIC CURVE PLOTTING OF PILOT PLANT PROCESS DATA, by E. C. Moncrief. 13 May 63 2p 1ref
Contract W7405-eng-26

TID-18620 OTS $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
OR-BL1, SUBROUTINE PACKAGE FOR PRODUCING CONTROL TAPES FOR BENSON-LEHNER PLOTTER, by G. B. Knight. 15 Apr 63, 14p
Contract W7405-eng-26

WCAP-3709 OTS $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
COMPILATION OF A MUFT LIBRARY (LIBRARY 567), by Robert A. Dannels and Dermot J. Bredin. Dec 62, 31p 43refs
Contract AT(30-1)3064

CVNA-128 OTS $6.60

Westinghouse Electric Corp., Pittsburgh, Pa.
A DIGITAL COMPUTER PROGRAM FOR CRITICAL FLOW DISCHARGE OF TWO-PHASE STEAM-WATER MIXTURES (CRITCO CODE) by Amir N. Nahavandi and Michael P. Rashevsky. Feb 62, 67p
Contract AT(30-1)2289.

MECHANICS

HW-SA-2772 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
STREAM FUNCTIONS FOR THREE-DIMENSIONAL FLOW IN HETEROGENEOUS POROUS MEDIA, by R. William Nelson. 15 Mar 63, 20p 19refs
Contract AT(45-1)1350

PB 163 796 OTS $1.10

Illinois U. [Urbana].
ANALYTICAL STUDY OF THE BEHAVIOUR OF FLUIDS IN POROUS SOLID MEDIA. Quarterly progress rept. no. 1, 1 Sep-1 Dec 59, by Walter Rose. 30 Nov 59, 10p
Contract DA 18-108-405-CML-517
AD-229 884

DESCRIPTORS: *Fluids, *Fluid mechanics, *Porous materials, Solids, Mathematical analysis.

Progress is reported for work accomplished on the following phases: (1) preparation of bibliography; (2) evaluation of electrokinetic effects in contact angle hysteresis; (3) influence of rate on advancing contact angle; (4) solutions of Stokes-Navier equations for capillary imbibition; and (5) preliminary enquiry as to the use of digital computer techniques to describe capillary imbibition phenomena. (Author)
(Mechanics, 20 Dec 63)

PB 163 797 OTS $7.60

Illinois U. [Urbana].
ANALYTICAL STUDY OF THE BEHAVIOUR OF FLUIDS IN POROUS SOLID MEDIA. Quarterly progress rept. no. 2, 1 Dec 59-1 Mar 60, by Walter Rose. 10 Mar 60, 71p 288refs
Contract DA 18-108-405-cml-517
AD-233 830

DESCRIPTORS: *Fluids, *Fluid mechanics, *Porous materials, Solids, Mathematical analysis, Bibliographies.

Progress is reported for work accomplished on the following phases: (1) preparation of bibliography; (2) evaluation of electrokinetic effects in contact angle hysteresis; (3) influence of rate on advancing contact angle; (4) solutions of Stokes-Navier equations for capillary imbibition; (5) preliminary enquiry as to the use of digital computer techniques to describe capillary imbibition phenomena. (Author)
(See also PB 163 796)

PB 163 798 OTS $5.60

Illinois U. [Urbana].
ANALYTICAL STUDY OF THE BEHAVIOUR OF FLUIDS IN POROUS SOLID MEDIA. Quarterly progress rept. no. 3, 1 Mar-23 May 60, by Walter Rose. 23 May 60, 59p 33refs
Contract DA 18-108-405-CML-517
AD-237 545

DESCRIPTORS: *Fluids, *Fluid mechanics, *Porous materials, Solids, Mathematical analysis, Polymers, Capillary tubes, Graphic analysis.

The capillary rise results of Jones and Ray (J. Am. Chem. Soc. 59:187, 1937) were used to test theories concerning the effect of electric charges at interfaces on interfacial tension. Values are plotted of the zeta potential calculated from Jones and Ray's results and the line given by Robinson (J. Electrochem. Soc. 106:520, 1959). An investigation was made of the effect of turbulence on streaming potential in a glass capillary tube. In the turbulent region neither the Helmholtz-Smolushowski equation nor the turbulent flow equation applied. Surface measurements were made on synthetic polymers which have low surface free energy. Currently available data were compared on the correlation of zeta potential and $\Delta \cos\theta$. A second order nonlinear differential equation whose solution represents the rise of liquid in a capillary tube was studied. A solution to the equation was initiated by graphical methods. The reasonableness of any steady state approximation of the transients of 1 immiscible fluid displacing another is questioned. (See also PB 163 797)

PB 163 799 OTS $7.60

Illinois U. [Urbana].
ANALYTICAL STUDY OF THE BEHAVIOUR OF FLUIDS IN POROUS SOLID MEDIA. Quarterly progress rept. no. 5, 1 Sep-31 Nov 60, by Walter Rose. 1 Dec 60, 72p 10refs
Contract DA 18-108-405-CML-517
AD-247 579

DESCRIPTORS: *Fluids, *Fluid mechanics, *Porous materials, Solids, Mathematical analysis.

This report includes:
Dynamic Contact Angle Measurement, by Walter Rose and R. W. Heins. [1 Dec 60] Unclassified report

Electrical-Analogy Network Study for Porous Media Containing Dead-End Pore Volume, by H. C. Tung and Walter Rose. [1 Dec 60] Unclassified report

Illinois U. Coll. of Engineering, Urbana.
Dead-End Pore Volume as Distributed Sources and Sinks, by Walter Rose, H. C. Tung, and Claude Newman. [1 Dec 60] Unclassified report

Network Model Studies, by H. Fara and W. Rose. [1 Dec 60] Unclassified report

Contact Angle Hysteresis and Surface Potentials, by Norman Street. [1 Dec 60] Unclassified report

Generalized Flow Problem in Porous Media, by Rao Channapragada. [1 Dec 60] Unclassified report

Further Consideration of the Brittin Equation, by H. Fara, W. Rose, and H. C. Tung. [1 Dec 60] Unclassified report

(See also PB 163 798)

PB 163 800 OTS $7.60

Illinois U. [Urbana].
ANALYTICAL STUDY OF THE BEHAVIOUR OF FLUIDS IN POROUS SOLID MEDIA. Quarterly progress rept. no. 6, 1 Dec 60-28 Feb 61, by Walter Rose. 1 Mar 61, 71p 12refs
Contract DA 18-108-405-CML-517
AD-252 193

DESCRIPTORS: *Fluids, *Fluid mechanics, *Porous materials, Solids, Mathematical analysis.

This rept. includes:
Investigations Of Brittin"s Equation Of Capillary Imbibition With Analog Computer, by H. C. Tung and H. Drews. 1960.
Illinois U. Coll. of Engineering, Urbana.
Capillary Imbibition After Initial Invasion, by W. Rose and H. Fara. 1960.

NASA N63-21358 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
NUMERICAL TECHNIQUES FOR THE SOLUTION OF THE COMPLETE BHATNAGAR-GROSS-KROOK KINETIC EQUATION FOR PLANE SHOCK WAVES, by M. T. Chahine. 3 Jun 63, 14p 6refs
Contract NAS7-100
Technical report no. 32-421; NASA CR-51234

UCRL-7291 OTS $1.60

Lawrence Radiation Lab., U. of California, Livermore.
SHOCK SPECTRA FOR A GENERAL FORCING FUNCTION, by A. F. Todaro. 25 Mar 63, 13p
Contract W7405-eng-48

Aerodynamics and Pneumatics

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Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
LAMINAR BOUNDARY-LAYER SEPARATION INDUCED BY FLARES ON CYLINDERS AT ZERO ANGLE OF ATTACK, by Donald M. Kuehn. 1962, 16p 7refs
Technical rept. R-146; NASA N63-14972

DESCRIPTORS: *Laminar boundary layer, Separation, Angle of attack, *Aerodynamic configurations, *Cylindrical bodies, *Bodies of revolution, Nose cones, *Mach number, *Reynolds number, *Heat transfer, Fluid flow, Atmosphere entry

Laminar boundary-layer separation induced by a flare on a cylindrical body of revolution has been experimentally investigated in the Mach number range of 2.0 to 5.5. The Reynolds number range (based on boundary-layer thickness) was $1X10^3$ to $30X10^3$. Geometric variables were nose shape, cylinder length, and flare angle. Test variables were Mach number, Reynolds number, and heat transfer. The purpose of the investigation was to determine which of these variables most influence laminar boundary-layer separation on a cylinder-flare configuration and to provide data that will aid in the prediction of laminar separation. (Author)

AD-292 247 OTS $5.60

General Applied Science Labs., Inc., Westbury, N. Y.
SUPERSONIC FLOW ABOUT GENERAL THREE-DIMENSIONAL BLUNT BODIES. VOLUME I. INVISCID SUPERSONIC FLOW ABOUT GENERAL THREE-DIMENSIONAL BLUNT BODIES. Final rept. on Aerodynamics and Flight Mechanics, by Roberto Vaglio-Laurin. Oct 62, 59p 9refs.
Contract AF 33(616)7721
ASD-TR-61-727, Vol. I

DESCRIPTORS: *Blunt bodies, *Supersonic flow, Fluid mechanics, Aerodynamics, Subsonic flow, Integral equations, Mathematical analysis, Shock waves, Theory, Supersonics.

The integral method of Dorodnitsyn-Belotserkovskii (DB Method) is extended to the analysis of general three-dimensional inviscid flows of ideal gases. Particular attention is focused on the subsonic region of flows about blunt configurations. Details of analysis are presented in connection with the first (linear) approximation of the aforementioned method. Straightforward solution of the ensuing numerical problem involves tremendous difficulties. Substantial simplifications are obtained by introducing a special perturbation technique along the lines previously used with success in the analysis of two-dimensional blunt-body problems. A quantitative assessment of the proposed method and technique for three-dimensional situations must await the availability of appropriate high speed machine programs; results for two-dimensional cases, however, support reasonable confidence. (Author)

AD-291 673 OTS $6.60

General Applied Science Labs., Inc., Westbury, N. Y.
SUPERSONIC FLOW ABOUT GENERAL THREE-DIMENSIONAL BLUNT BODIES. VOLUME II. HEAT TRANSFER DUE TO THE INTERACTION BETWEEN A SWEPT PLANAR SHOCK WAVE AND A LAMINAR BOUNDARY LAYER. Final rept. on Hypersonic Aerodynamics Study, by A. Martellucci and P. A. Libby. Oct 62, 65p 15refs
Contract AF 33(616)7721
ASD-TR-61-727, Vol. II

DESCRIPTORS: *Blunt bodies, *Supersonic flow, Aerodynamics, *Laminar boundary layer, *Heat transfer, Shock waves, Flat plate models, Thermodynamics, Boundary layer, Theory, Integral equations, Mathematical analysis

In this report there is studied by theoretical means the interaction between a laminar boundary layer on a flat plate and a planar shock wave which is swept with respect to the flow external to the boundary layer but normal to the plate. A model for the inviscid flow is discussed first. It is shown that for a planar shock, the effect of sweep is easily included and thus that a model for two-dimensional flow is basic to the problem. The analysis is compared to available data for two-dimensional flows and shown to be in good agreement therewith. (Author) (See also AD-292 247)

AD-292 328 OTS $8.60

General Applied Science Labs., Inc., Westbury, N. Y.
SUPERSONIC FLOW ABOUT GENERAL THREE-DIMENSIONAL BLUNT BODIES. VOLUME III. FLOW FIELD ANALYSIS OF REENTRY CONFIGURATIONS BY A GENERAL THREE-DIMENSIONAL METHOD OF CHARACTERISTICS. Final rept. on Aerodynamics and Flight Mechanics, by G. Moretti, E. A. Sanlorenzo, E. E. Magnus, and G. Weilerstein. Oct 62, 92p 7refs
Contract AF 33(616)7721
ASD-TR-61-727, Vol. III

DESCRIPTORS: *Blunt bodies, *Supersonic flow, Aerodynamics, Integral equations, Mathematical analysis, Shock waves, Theory, Mathematical computer data, *Re-entry aerodynamics, Programming, Supersonics.

A technique to compute three-dimensional steady supersonic flow fields, applying the method of characteristics, is described. The gas may be either a perfect one or real air in equilibrium. The technique has been programmed for the IBM 7090 computer and has been successfully applied to determine the flow field past lifting hypersonic vehicles. (Author) (See also AD-291 673)

PB 163 717 OTS $3.60

James Forrestal Research Center, Princeton, N. J.
BOUNDARY LAYER FLOW WITH SUSPENDED PARTICLES, by H. H. Chiu. Aug 62, 37p 2refs
Contract AF 49(638)465
Rept. 620; AFOSR-4540; NASA N63-11957

DESCRIPTORS: *Laminar boundary layer, *Gas flow, *Particles, Colloids, Heat transfer, Equations, Series, Aerodynamics, Mathematical analysis, Aerodynamic configurations, *Fluid dynamic properties.

The laminar boundary layer flow with particles injected upstream of the leading edge of a plate is investigated. The boundary layer equations for the gas, and the equations governing the rate of momentum and heat transfer between the gas and the particles have been solved simultaneously. A series solution is constructed in terms of a system of universal functions from which the solution for the arbitrary velocity and temperature ratio of the gas and the particles at the leading edge may be calculated. A closed form solution is obtained for the particle motion. It is found, within the validity of the approximation, that the wall shear force may be larger or smaller than that of the flow of clean gas, depending on the relative magnitude of the velocity of the particles and the gas at the leading edge; and that the wall heat transfer depends primarily on the relative magnitude of the temperature of the particles and the gas at the leading edge, and upon the wall temperature. (Author)

Order from GPO $0.40 as
NAS 1.12:142

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECT OF LARGE-AMPLITUDE OSCILLATIONS ON HEAT TRANSFER, by Charles E. Feiler and Ernest G. Yeager. 1962, 25p 26refs
Technical rept. R-142; NASA N63-12597

DESCRIPTORS: *Heat transfer, Oscillation, *Flat plate models, *Acoustics, Boundary layer, Fluid flow, Schlieren photography

The heat transfer from a heated flat plate to an airstream having large-amplitude flow oscillations was studied. The oscillation frequency was varied from 34 to 680 cps. The root-mean-square oscillation amplitude was as much as 65 percent of the mean flow rate. In the presence of oscillations, the heat-transfer coefficient was increased by as much as 65 percent when compared with the coefficient at the same mean flow rate in the absence of oscillations. High-speed schlieren movies of the thermal boundary layer revealed that flow reversal occurred near the plate surface at each frequency during a portion of the period of oscillation. The mean flow velocity ranged from about 30 to 100 feet per second. (Author)

METALLURGY

TID-3572 OTS $2.25

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
METALLURGY OF MOLYBDENUM, NIOBIUM, AND MOLYBDENUM-NIOBIUM ALLOYS. A literature search. Apr 63, 111p 1910refs Prepared in cooperation with American Society for Metals; Defense Documentation Center; and General Electric Co.

NAA-SR-MEMO-6836 OTS $1.60

Atomics International Canoga Park, Calif.
FABRICATION AND PROPERTIES OF THE METAL HYDRIDES, by J. B. Vetrano. 1 Nov 61, 12p
Contract AT(11-1)GEN-8

TID-17310 OTS $1.60

Atomics International, Canoga Park, Calif.
PULSED-MAGNETIC-FIELD STUDIES OF SUPERCONDUCTING TRANSITION METAL ALLOYS AT HIGH AND LOW CURRENT DENSITIES, by T. G. Berlincourt. 1962, 15p 17refs
Contract AT(11-1)GEN-8.

NAA-SR-MEMO-1522 OTS $1.10

Atomics International, Canoga Park, Calif.
RECOVERY OF ELECTRICAL RESISTIVITY OF COLD WORKED THORIUM, by C. J. Meechan. 21 Nov 55, 3p
Contract AT(11-1)GEN-8.

BMI-X-10040 OTS $1.60

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF NIOBIUM-BASE ALLOYS FOR USE IN A NUCLEAR SUPERHEATER. Quarterly progress rept. Jan-Mar 63, by John A. DeMastry, Arthur A. Bauer, and Frank A. Rough. 1 Apr 63, 12p
Contract W7405-eng-92
EURAEC-626

BRB-71 OTS $4.60

Bridgeport Brass Co., Conn.
BYNAPAK EXTRUSION OF MARK V-B OUTER FUEL ELEMENT CORES. Rept. no. 1, by Q. C. Carloni and L. Lewis. 25 Mar 63, 46p 3refs
Contract AT(30-1)1405

BRB-70 OTS $6.60

Bridgeport Brass Co., Conn.
PROCESS DEVELOPMENT SUMMARY, JANUARY-JUNE, 1962, by D. R. Jefferson, 25 Jan 63, 64p
Contract AT(30-1)1405

BRB-73 OTS $2.00

Bridgeport Brass Co., Seymour, Conn.
DYNAPAK EXTRUSION OF I & E FUEL ELEMENTS. PHASE III. TECHNICAL ACTIVITY. ALPHA PHASE EXTRUSION AND BETA PHASE HEAT TREATMENT IN ONE OPERATION, by Q. C. Carloni and L. Lewis. 14 May 63, 85p 4refs
Contract AT(30-1)1405.

DRI-2091 OTS $ 1.10

Denver Research Inst., Colo.
DETERMINATION OF THE NIOBIUM-RICH REGION OF THE TERNARY PHASE DIAGRAMS, NIOBIUM-TUNGSTEN-HAFNIUM AND NIOBIUM-TUNGSTEN-ZIRCONIUM, Quarterly rept. no. 2, 1 Dec 62-1 Mar 63, by Albert S. Yamamoto and Charles E. Lundin. Mar 63, 10p.
Contract AT(11-1)1092

UCRL-6389 OTS $2.60

Lawrence Radiation Lab., U. of California, Livermore.
ION ADSORPTION ON METALS FOR LOW FRACTIONAL SURFACE COVERAGE, by Raymond Fox and William Gust. 6 Aug 61, 21p 14refs
Contract W7405-eng-48

TID-16731 OTS $3.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
ANISOTROPY OF THE SURFACE DIFFUSION COEFFICIENT FOR COPPER, by P. G. Shewmon and J. Y. Choi. 21 Sep 62, 37p 11refs

TID-17020 OTS $1.60

National Lead Co. of Ohio, Cincinnati.
METALLOGRAPHY OF URANIUM AT ELEVATED TEMPERATURES, by W. N. Wise. 26 Oct 62, 11p 1ref [AT(30-1)1156]

TID-18420 OTS $14.00

Northwestern Technological Inst., Evanston, Ill.
KINETICS OF OXIDATION OF IRON-CHROMIUM ALLOYS AND THE TRANSPORT PROPERTIES OF THE OXIDES IN CARBON DIOXIDE-CARBON MONOXIDE MIXTURES, by Roger L. Levin and J. Bruce Wagner, Jr. 31 Jan 63, 207p 88refs
Contract AT(11-1)1126

NMI-2114 OTS $2.60

Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. Progress rept. for Jan 63. 12 Apr 63, 23p
Contract AT(30-1)2784

NMI-1253 OTS $1.75

Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. HIGH TEMPERATURE PROPERTIES OF REFRACTORY ALLOYS. Summary technical rept. 1 Jul 61-30 Jun 62, by E. J. Rapperport and A. L. Geary. 20 May 63, 73p 7refs
Contract AT(30-1)2784.

NMI-2802 OTS $6.60

Nuclear Metals, Inc., Concord, Mass.
SUMMARY OF PROGRESS ON THE STUDY OF BETA TREATMENT OF URANIUM, SEPTEMBER 1 TO NOVEMBER 30, 1960, by R. B. Russel. 27 Dec 60, 69p 9refs
Contract AT(30-1)1565

TID-18566 OTS $1.10

Savannah River Lab., Aiken, S. C.
HOT METALLOGRAPHY FACILITY AT SAVANNAH RIVER LABORATORY, by R. D. Kelsch. Apr 63, 10p 2refs
Contract AT(07-2)1

NYO-10354 OTS $3.60

Stanley-Thompson Lab., Columbia U., New York.
A STUDY OF INCLUSIONS IN URANIUM. Final rept. by George L. Kehl and Eric Mendel. 1963, 37p 12refs
Contract AT(30-1)15

GEAP-4115 OTS $3.60

Vallecitos Atomic Lab., General Electric Co., San Jose, Calif.
FABRICATION OF ZIRCONIUM ALLOYS FOR SPECIFIC ZIRCONIUM ALLOY DESIGN PROGRAM, by K. C. Antony and L. T. Jones. 5 Dec 62, 36p
Contract AT(04-3)189

GEAP-4192 OTS $0.75

Vallecitos Atomic Lab., San Jose, Calif.
HYDROGEN OVERVOLTAGE AND ELECTROCHEMICAL POTENTIALS OF ZIRCONIUM AND ZIRCONIUM INTERMETALLICS, by J. S. Armijo. 1 Mar 63, 25p 24refs
Contract AT(04-3)189.

PB 163 706 OTS $3.60

[Vitro Labs.] Silver Spring, Md.
HIGH TEMPERATURE MICRO-HARDNESS TESTER. Appendix D, Item 1 to Final rept., on The Materials Research Program, by Paul S. Bergh. 23 Dec 48, 32p 9refs
Contract NOrd-9829
Technical rept. no. M-5

DESCRIPTORS: *Heat resistant metals and alloys, *Hardness, *Test equipment, Design.

The apparatus consists of four systems: Testing Chamber, Vacuum System, Loading System and Electrical System. The relationship of these is illustrated. The apparatus is described in detail. Appendix 1 outlines the history of the development of the final design.

Ferrous Metals

ATL-A-133 OTS $3.60

Advanced Technology Labs., Mountain View, Calif.
INVESTIGATION OF THERMAL-STRESS-FATIGUE BEHAVIOR OF STAINLESS STEELS. Quarterly progress rept. no. 3, Jul-Sep 62, by K. E. Horton. 33p 8refs
Contract AT(04-3)250
EURAEC-481

ATL-A-134 OTS $4.60

Advanced Technology Labs., Mountain View, Calif.
INVESTIGATION OF THERMAL-STRESS-FATIGUE BEHAVIOR OF STAINLESS STEELS. Quarterly progress rept. no. 4, Oct-Dec 62, 41p 14refs
Contract AT(04-3)250
EURAEC-555

HW-75484 OTS $3.60

Hanford Atomic Products Operation, Richland, Wash.
THE NOTCH SENSITIVITY OF ASTM A-212 GR. B STEEL AND PIPE WELDS UNDER REVERSED CYCLE LOADING, by W. J. Love. 15 Nov 62, 34p 9refs
Contract AT(45-1)1350

HE-150-204 OTS $8.10

Institute of Engineering Research, U. of California, Berkeley.
OPTICAL STRAIN MEASUREMENTS IN STAINLESS STEEL AT TRANSIENT TEMPERATURES TO 200°F, by Claude Lawrence Arne. 20 Dec 62, 82p 25refs
Contract W7405-eng-48
UCRL-13080; Series no. 128, issue no. 9

MSAR-63-47 OTS $1.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200°F SODIUM ON AUSTENITIC AND FERRITIC STEELS. Progress rept. no. 30. 15 Mar 63, 12p
Contract AT(11-1)765

Light Metals

PB 163 761 OTS $14.00

Battelle Memorial Inst., Columbus, Ohio.
SURVEY ON THE RESISTANCE SPOT AND SEAM WELDING OF ALUMINUM AND MAGNESIUM IN THE AIRCRAFT INDUSTRY. Interim summary rept., Sep 53-Jul 54, by P. M. Giles, W. H. Kearns, R. P. C. Rasmusen, S. A. Gordon, and W. S. Hyler. 1 Jul 54, 207p 295refs
Contract AF 33(600)25369, subcontract to Goodyear Aircraft Corp.
Rept. no. GER 6152; AD-60 886

DESCRIPTORS: *Aircraft industry, *Magnesium alloys, *Aluminum alloys, Resistance welding, *Spot welding, Welds, *Airplane panels.

Production process control, specifications; instrumentation and welder-control systems; design considerations; cleaning methods; welding applications: materials welded; electrodes; welding machines; development and research; magnesium.

PB 163 763 OTS $23.50

Goodyear Aircraft Corp., Akron, Ohio.
DEVELOPMENT PROGRAM FOR SPOT AND SEAM WELDING ON ALUMINUM ALLOYS. Final engineering rept. Oct 53-Mar 58. 7 Mar 58, 462p 308refs
Contract AF 33(600)25369
Rept. no. GER-8333; AMC TR-58-7-262; AD-156 052

DESCRIPTORS: *Aluminum alloys, Welding, *Welds, Tests, *Riveted joints, *Airplane panels, Bibliographies, Spot welding, Aircraft industry, *Magnesium alloys.

Single spot, roll spot, and seam welds of 7075, 2024, 6061, 2014, and X7178 aluminum alloys were produced in a wide variety of sizes and types. Sheet gage thickness of from 0.020 to 0.250 inches for spot welds, and from 0.020 to 0.125 for seam welds, in both equal and unequal gage combinations, were included. Specimens were tested to failure and the causes of failure identified and analyzed. Design criteria were further developed and standardized by testing the strength of resistance-welded joints of various configurations and weld types and evaluating the results of these tests. Basic joints were of single and multiple row, lap and single strap butt-splice types. Geometric considerations were studied and the effects of localized variations in spot pitch and end distance were noted for quality control information purposes. Tests were conducted to establish the comparative strength of riveted to spot welded joints in other (than splice) structural applications. A design manual has been prepared and pertinent changes to existing documents, relative to the application and control of these welding processes, are presented.

PB 163 762 OTS $26.00

Goodyear Aircraft Corp., Akron, Ohio.
THE RESISTANCE SPOT AND SEAM WELDING OF ALUMINUM DEVELOPMENT PROGRAM, Interim summary rept. on phase IIB, 1 May 55-2 Apr 56, by M. W. Seese. 1 Apr 56, 602p
Contract AF 33(600)25369
Rept. no GER 7324; AD-104 223

DESCRIPTORS: *Aluminum alloys, Spot welding, *Welds, Tests, *Riveted joints, *Airplane panels, Resistance welding, Airframes.

Spot welds, rollspot welds and seam welds in 7075, 2024, 6061, 2014, and X7178 aluminum alloys were produced in a wide variety of sizes and types and tested to failure. The causes of failure were analyzed to determine the feasibility of increased application of welding techniques to the fabrication of airframes. Sheet gage thicknesses from 0.020 to 0.250 inch for spot welds, and from 0.020 to 0.125 for seam welds, were included in both equal and unequal gage combinations. Riveted aluminum alloys were also tested to provide a basis for comparison. Test results indicate that resistance welding techniques can be effectively utilized in the fabrication of airframes, with resulting increases in the variety of structures and in economy of manufacture. (Author)

PB 163 707 OTS $1.10

Massachusetts Inst. of Tech., Cambridge.
RESEARCH ON MECHANICAL PROPERTIES OF SINTERED ALUMINUM POWDER. Progress rept., 1 Dec 59-1 Mar 60, by Richard Murphy, Noboru Komatsu, Joseph Blucher, Jens Rasmussen, and Nicholas J. Grant. [1960] 6p
Contract AF 33(616)5424
Proj. DSR 7809; AD-234 443

DESCRIPTORS: *Powder metals, *Aluminum, Mechanical properties, Sintering, *Nickel alloys, *Copper alloys, Aluminum compounds, Oxides, *Recrystallization, *Dispersion hardening, Creep, Rupture.

Wrought Ni-Cu alloys were annealed at 1650°F in an Ar atmosphere for 1/2 hr. Hardness values for the annealed samples were (1) 55.3 Rockwell B for alloy 452 (88.4% Ni-10.2% Cu); (2) 53.8 Rockwell B for alloy 453 (78.7% Ni-19.8% Cu); (3) 59.3 Rockwell B for alloy 454 (44.3% Ni-53.9% Cu); (4) 74.4 Rockwell E for alloy 702 (30% Ni-68.9% Cu); and (5) 47.16 Rockwell E for alloy 755 (10% Ni-88.35% Cu). In recrystallization temperature studies, 0.2-in. -diam. 0.3-in. long specimens received 50% cold work by compression. After annealing at temperatures ranging from 1000° to 1475°F the Rockwell B hardness values underwent changes from 95.9 to 50.3, 96.9 to 58.7, 91.9 to 64, 82.7 to 22.8, and 98 to 46.4, for alloys 452, 453, 454, 702, and 755, respectively. Creep rupture tests were made in an Ar atmosphere at 845°F for the high-Cu alloys and 1500°F for the high-Ni alloys. A method was developed for depositing Al_2O_3 on Ni powders.

Structural Metallurgy and Corrosion

NAA-SR-MEMO-3518 OTS $1.10

Atomics International, Canoga Park, Calif.
CORROSION TESTS UTILIZING OMRE COOLANTS, by D. M. Jones. 19 Jan 59, 3p 3refs
Contract AT(11-1)GEN-8

BMI-X-222 OTS $1.10

Battelle Memorial Inst., Columbus, Ohio.
CORROSION OF HYDROFLUORINATOR LINES HFV-2207-1 AND Ms-1000-1, by P. D. Miller, W. N. Stiegelmeyer, W. K. Boyd, and F. W. Fink. 1 Apr 63, 8p
Contract W7405-eng-92

DPST-62-71-4 OTS $1.60

Du Pont de Nemours, E. I., and Co., Inc., Wilmington, Del.
APPLICATION OF THE ELECTRON MICROPROBE TO THE STUDY OF ZIRCALOY CORROSION FILM. Quarterly progress rept. no. 1, Oct-Dec 62. Feb 63, 14p
Contract AT(07-2)1

ORNL-TM-528 OTS $2.60

Oak Ridge National Lab., Tenn.
DESIGN AND OPERATION OF FORCED-CIRCULATION CORROSION TESTING LOOPS WITH MOLTEN SALT, by J. L. Crowley, W. B. McDonald and D. L. Clark. 1 May 63, 24p 11refs
Contract W7405-eng-26

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

NYO-10145 OTS $1.60

Air Reduction Co., Inc., Murray Hill, N. J.
RESEARCH APPLICATIONS OF KRYPTON-85. Quarterly progress rept. 1 Oct-31 Dec 62, by Arthur M. Feibush. 11p 4refs
Contract AT(30-1)2906.

TID-18481 OTS $8.60

Argonne National Lab., Ill.
ADDENDA TO NEWSLETTERS NO. 3 AND NO. 4, by H. Greenspan and I. G. Baksys. Reactor Physics Constants Center Newsletter No. 9. Mar 63, 92p
Contract W31-109-eng-38

TID-18305 OTS $2.60

Argonne National Lab., Ill.
CHEMICAL DOSIMETRY AT HIGH DOSE RATES, by Edwin J. Hart. Jan 63, 22p 8refs
Contract W31-109-eng-38

TID-18295 OTS $4.60

Argonne National Lab., Ill.
COUPLED CHANNEL APPROACH TO J = 3/2+ RESONANCES IN THE UNITARY SYMMETRY MODEL, by A. W. Martin and K. C. Wali. Dec 62, 45p 28refs
Contract W31-109-eng-38

AI-6699 OTS $1.60

Atomics International, Canoga, Park, Calif.
TABLES AND GRAPHS FOR COMPUTING DEBYE-WALLER FACTORS IN MOSSBAUER EFFECT STUDIES, by Arthur H. Muir, Jr. 15 Jan 62, 14p 10refs
Contract AT(11-1)GEN-8

TID-17223 OTS $2.25

Booz-Allen Applied Research, Inc., Glenview, Ill.
DEVELOPMENT OF KRYPTON-85 CLATHRATE ANALYTICAL TECHNIQUES TO MEASURE OXIDATION-REDUCTION PRODUCTS IN THE LIQUID STATE, by George J. Rotariu, Elizabeth L. Hoskins, and Donald M. Hattori. Jul 62, 108p 27refs
Contract AT(11-1)1061.

BNL-6849 OTS $4.60

Brookhaven National Lab., Upton, N. Y.
COPOLYMERIZATION OF ETHYLENE INDUCED BY COBALT-60 GAMMA RADIATION, by Peter Colombo and Meyer Steinberg. Mar 63, 43p 18refs
Contract AT(30-2)GEN-16

BNL-6852 OTS $5.60

Brookhaven National Lab., Upton, N. Y.
FISSION FRAGMENT ENERGY DEPOSITION EFFICIENCY FOR THIN URANIUM-CONTAINING ELEMENTS AND THE FIXATION OF NITROGEN, by Meyer Steinberg, Marco Loffelholz, and Jacob Pruzansky. Mar 63, 57p 28refs
Contract AT(30-2)GEN-16

HW-SA-2364 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
CHARACTERIZATION OF A STRONTIUM-SELECTIVE ZEOLITE, by L. L. Ames, Jr. 20 Dec 61, 15p 13refs
Contract AT(45-1)1350

HW-SA-2875 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
FAST-NEUTRON TOTAL CROSS SECTIONS OF 44 ELEMENTS, by D. W. Glasgow and D. G. Foster. 9 Apr 63, 10p
Contract AT(45-1)1350

HW-SA-2396 OTS $3.60

Hanford Atomic Products Operation, Richland, Wash.
SOLVENT EXTRACTION RECOVERY AND PURIFICATION OF STRONTIUM-90, by Wallace W. Schulz, John E. Mendel, and Gerald L. Richardson. 13 Dec 61, 33p 12refs
Contract AT(45-1)1350

LAS-SR-161-60 OTS $1.60

Laboratories for Applied Sciences, U. of Chicago, Ill.
RADIOISOTOPES RESEARCH, DEVELOPMENT, AND RELATED ACTIVITIES. Quarterly progress rept. 15 Dec 62-15 Mar 63. Apr 63, 16p
Contract AT(11-1)712

NYO-10062 OTS $8.10

Laboratory for Nuclear Science, Inst. of Tech., Cambridge, Mass.
PROGRESS REPORT [ON NUCLEAR RESEARCH]. 1 Nov 62, 89p 80refs
Contracts AT(30-1)2098 and AT(30-1)905

NYO-2304 OTS $6.60

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
REPORT OF PROGRESS ON CHEMISTRY RESEARCH, MAY 1, 1962-MAY 1, 1963. 70p 13refs
Contract AT(30-1)905

UCRL-6795T OTS $1.10

Lawrence Radiation Lab., U. of California, Livermore.
A CALCULATIONAL METHOD TO DETERMINE GAMMA HEATING IN INFINITE SOURCE MEDIA, by Alex Lorenz. 16 Feb 62, 4p
Contract W7405-eng-48

UCRL-7233 OTS $2.60

Lawrence Radiation Lab., U. of California, Livermore.
NEUTRON SPECTRA FROM PROTON AND ALPHA BOMBARDMENT OF HEAVY NUCLEI, by J. D. Anderson and C. Wong. 21 Mar 63, 22p 22refs
Contract W7405-eng-48

UCRL-6404 OTS $1.60

Lawrence Radiation Lab., U. of California, Livermore.
SHELL MODEL STUDY OF Mn^{55}, by Ervin H. Schwarcz. 17 Nov 61, 20p 16refs
Contract W7405-eng-48

TID-18898 OTS $2.00

Michigan U., Ann Arbor.
RADIOCHEMICAL SEPARATIONS BY AMALGAM EXCHANGE, by Iqbal Hussain Qureshi. May 63, 79p 52refs

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Michigan U. Coll. of Engineering, Ann Arbor.
NEUTRON CROSS SECTION AND SPECTRA STUDIES. Technical progress rept. by P. F. Zweifel. Feb 63, 17p 19refs
Contract AT(11-1)917
03712-5-P

ORNL TM-514 OTS $1.10

Oak Ridge National Lab., Tenn.
SOME SIMPLIFIED EXPRESSIONS FOR THE 3-j SYMBOLS, by C. D. Zerby and R. R. Coveyou. 15 Mar 63, 9p 4refs
Contract W7405-eng-26

TID-18442 OTS $2.60

Pennsylvania State U., University Park.
LOW ENERGY NUCLEAR PHYSICS. Progress rept. 1 Jun 62-31 May 63, by R. R. Roy. Mar 63, 25p 11refs
Contract AT(30-1)2399

TID-18444 OTS $1.10

Saint John Fisher Coll., Rochester, N. Y.
A STUDY OF PROTON-INDUCED SPALLATION REACTIONS OF NEODYMIUM-150, Progress rept. 1 Jun 62-31 May 63, by Clarence G. Heininger, Jr. 4p 6refs
Contract AT(30-1)2545

TID-18450 OTS $2.60

Westinghouse Research Labs., Pittsburgh, Pa.
STUDY OF APPLICATIONS OF THE MOSSBAUER EFFECT IN SCIENCE AND TECHNOLOGY. Quarterly progress rept. 15 Oct 62-15 Jan 63, by L. M. Epstein. 21p 5refs
Contract AT(30-1)2989

TID-18503 OTS $1.10

Wisconsin U., Madison.
THERMONUCLEAR PLASMA STUDIES. Quarterly status rept. no. 1. 15 Apr 63, 6p 1ref
Contract AT(11-1)1233

Elementary Particles

BNL-5517 OTS $1.10

Brookhaven National Lab., Upton, N. Y.
RELATION BETWEEN BINDING ENERGY AND COUPLING CONSTANT, by M. Nauenberg. 2 Jan 61, 5p 6refs
Contract AT(30-2)GEN-16

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Brookhaven National Lab., Upton, N. Y.
THEORY OF THE QUANTIZATION OF BARYON NUMBER AND HYPERCHARGE, by Paul C. DeCelles. 16 Oct 61, 10p 11refs
Contract AT(30-2)GEN-16

TID-18424 OTS $1.10

Michigan U., Ann Arbor.
THE VALIDITY OF THE FERMI APPROXIMATION IN SLOW NEUTRON SCATTERING, by J. P. Plummer and G. C. Summerfield. 1962, 8p 11refs
Contract AT(11-1)917

TID-18436 OTS $4.60

University of Southern California, Los Angeles.
PASSAGE OF CHARGED PARTICLES THROUGH MATTER. Technical rept. no. 2, by Hans Bichsel. 6 Jan 61, 48p 88refs
Contract AT(04-3)136

TID-18277 OTS $2.60

Wisconsin U., Madison.
SCATTERING OF POLARIZED NEUTRONS, by H. H. Barschall. 1962, 27p 47refs
Contract AT(11-1)GEN-7

Instruments and Installations

ATL-A-124 OTS $3.60

Advanced Technology Labs., Mountain View, Calif.
DESIGN AND DEVELOPMENT OF FAST-RESPONSE THERMOPILE-TYPE NEUTRON-FLUX-SENSITIVE DEVICE. Final rept phase 2, by L. J. Gee. 31 Oct 62, 39p
Contract AT(04-3)250

NASA N63-21271 OTS $1.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A MICROMETEOROID VELOCITY DETECTOR, by Frank Neuman. Sep 63, 58p 13refs
Technical note D-1977

TID-16859 OTS $1.60

Argonne National Lab., Ill.
DESIGN AND CONSTRUCTION OF A LARGE MAGNETIC-FIELD SPARK CHAMBER SYSTEM, by G. R. Burleson, T. F. Hoang, P. I. P. Kalmus, R. L. Kuskowski, and L. Q. Niomela. Jul 62, 11p 3refs
Contract W31-109-eng-38
UAC-6660

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AN ITERATIVE SOLUTION OF THE MATRIX REPRESENTATION OF DETECTION SYSTEMS, by R. Gold. 8 Jan 63, 31p 22refs
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LOW TEMPERATURE EFFECTS ON HIGH VOLTAGE BREAKDOWN AT SMALL GAPS. PART I, by D. J. DeGeeter. 16 May 62, 18p 8refs
Contract W31-109-eng-38

TID-18289 OTS $4.60

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RAPID BEAM HANDLING SYSTEM OF THE ZGS MACHINE OR BEAM BUMPER JUMP TARGET SYSTEM, by Theodore deParry 19 Dec 62, 45p
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Argonne National Lab., Ill.
SEMICONDUCTOR NUCLEAR DETECTORS, by H. M. Mann, J. W. Haslett, and F. J. Janarek. Jan 62, 22p 7refs
Contract W31-109-eng-38

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VARIANCE IN SCINTILLATOR LIGHT COLLECTION, by George A. Sinnott and William W. Managan. Feb 62, 8p
Contract W31-109-eng-38
UAC-6097

TID-18545 OTS $1.10

Atomic Power Development Associates, Inc., Detroit Mich.
SODIUM RESISTIVITY METER LOOP. Summary rept. Feb 63. 10p
Contract AT(11-1)865

TID-18162 OTS $2.60

Badger Meter Mfg. Co., Milwaukee, Wis.
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Contract AT(11-1)1111
189-12

TID-18409 OTS $1.60

Badger Meter Mfg. Co., Milwaukee, Wis.
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Contract AT(11-1)1111
189-15

BNL-6899 OTS $1.10

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A CALIBRATION CURVE FOR COSMOTRON IONIZATION CHAMBERS, by G. Levine and C. Swartz. 7 Nov 60, 4p
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Brookhaven National Lab., Upton, N. Y.
CERENKOV AND SCINTILLATION PROPERTIES OF PLEXIGLAS UVT AND UVA, by D. Balzarini. Sep 60, 10p 5refs
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COMPARISON OF LUMPED AND DISTRIBUTED INFLECTOR MAGNETS, by E. B. Forsyth. 18 Mar 63, 10p 4refs
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FAST ANALYSIS SYSTEM FOR BUBBLE CHAMBER DATA, by Paul V. C. Hough. 25 Jan 63, 28p
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Contract AT(30-2)GEN-16

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Contract W7405-eng-48

UCRL-10080 OTS $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
DESIGN AND DEVELOPMENT OF THE ION SOURCE FOR THE BERKELEY 88-INCH CYCLOTRON, by Kenneth W. Ehlers. 23 Feb 62, 14p 7refs
Contract W7405-eng-48

UCRL-6575 OTS $4.60

Lawrence Radiation Lab., U. of California, Livermore.
AUTOMATIC FREQUENCY CONTROL OF ELECTRON LINEAR ACCELERATORS THROUGH THE USE OF DIGITAL TECHNIQUES, by Harlin L. Bunn. 17 Oct 61, 43p
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CALCULATION OF THE OPTIMUM DIMENSIONS OF COLLIMATORS FOR NEUTRON DIFRACTION, by Ian R. Jones. 14 Mar 62, 8p 2refs
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UCRL-6793 OTS $1.10

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LADC-4189

TID-18405 OTS $3.60

Michigan U. Coll. of Engineering, Ann Arbor.
THE EFFECT OF SAMPLE ORIENTATION ON COUNTING RATES IN A NEUTRON SPECTROMETER WITH LARGE AREA DETECTORS, by C. D. Striffler. Feb 63, 34p
Contract AT(11-1)917

ORNL-TM-524 OTS $1.60

Oak Ridge National Lab., Tenn.
A COLLIMATOR STUDY FOR A 20-GEV ELECTRON BEAM, by C. D. Zerby and H. S. Moran 25 Mar 63, 15p
Contract W7405-eng-26

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Stanford Linear Accelerator Center, Stanford U., Calif.
TWO-MILE ACCELERATOR PROJECT. Final and quarterly status rept. 1 Apr-30 Jun 62. Jul 62, 82p 20refs
Contracts AT(04-3)363 and Contract AT(04-3)400

TID-18648 OTS $1.60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
AUTOMATED SMEAR PROGRAM FOR RADIOACTIVE MATERIAL, by Merwyn Sanders. [1963] 12p
Contract W7405-eng-26

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United Nuclear Corp., White Plains, N. Y.
DEVELOPMENT OF A CONTINUOUS METER FOR OXYGEN IN SODIUM. Quarterly progress rept. 1 Sep-31 Dec 62, by H. Steinmetz. 25 Jan 63, 22p
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ULTRAHIGH VACUUM TECHNIQUES. Annual rept. 1 Jan-31 Dec 62, by D. W. Feldman, R. E. Fox, O. M. Katz, W. J. Lange, and G. J. Schulz. 20 Feb 63, 45p 13refs
Contract AT(30-1)2823

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Advanced Technology Labs., Mountain View, Calif.
DEVELOPMENT OF CLAD CERAMIC FUEL PLATES BY SPRAY-COATING TECHNIQUES. Final rept. phase I, by N. E. Weare. 31 Oct 61, 104p 3refs
Contract AT(04-3)250
EURAEC-439

ACNP-63005 OTS $7.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
CLUSTERED PIN SUPERHEATER LATTICE EXPERIMENTS, by A. Selep. 12 Feb 63, 72p 2refs
Contract AT(11-1)589

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. BORON STAINLESS STEEL CONTROL RODS FOR PATHFINDER REACTOR. Final summary rept. by D. A. Patterson, D. A. Nehrig, R. H. Klumb, and T. E. Peterson, 15 Feb 63, 54p 12refs
Contract AT(11-1)589

ACNP-62034 OTS $2.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT TECHNICAL PROGRESS REPORT, JULY-SEPTEMBER, 1962. 15 Feb 63, 28p
Contract AT(11-1)589

TID-18241 OTS $3.60

Allis-Chalmers Mfg. Co., Washington, D. C.
BURST SLUG DETECTION EQUIPMENT SHIELDING ANALYSIS, by D. Luse. 16 Nov 60, 31p
Contract AT(10-1)925

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DESIGN AND ANALYSIS: CORE STRUCTURE AND BOTTOM PLATE, by Paul V. Goulden. 21 Apr 60, 18p 7refs
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DESIGN AND ANALYSIS OF CORE PERIPHERAL RESTRAINTS, by Paul V. Goulden. 8 Jul 60, 23p 4refs
Contract AT(10-1)925

TID-18240 OTS $3.60

Allis-Chalmers Mfg., Co., Washington, D. C.
DESIGN OF THE PHENUMATIC TEMPERATURE MONITORING SYSTEM, by D. A. Lampe. 1 Sep 60, 38p 6refs
Contract AT(10-1)925

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Allis-Chalmers Mfg. Co., Washington, D. C.
DESIGN REQUIREMENT. BURST SLUG DETECTION SYSTEM, by D. Luse. 6 Nov 59, 19p
Contract AT(10-1)925

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DESIGN REQUIREMENT DUMMY FUEL ASSEMBLIES 11 Jan 60, 19p
Contract AT(10-1)925

TID-18239 OTS $2.60

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DESIGN REQUIREMENTS, CORE STRUCTURE, by James V. Neely. 11Dec 59, 22p
Contract AT(10-1)925

ACNP-62600 OTS $2.60

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FAILURE OF THE FUEL-LATCHING MECHANISM, by J. A. Landoni. 9 Nov 60, 27p 5refs
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TID-18528 OTS $6.60

Allis-Chalmers Mfg. Co., Washington, D. C.
HAZARDS ANALYSIS. DEPRESSURIZATION ACCIDENT, by D. A. Lampe. 18 Nov 60, 62p 8refs
Contract AT(10-1)925

ACNP-61529 OTS $1.60

Allis-Chalmers Mfg. Co., Washington, D. C.
HAZARDS ANALYSIS. MINOR HAZARDS, by D. Luse and R. S. Miller. 17 Mar 61, 17p 18refs
Contract AT(10-1)925

ACNP-62607 OTS $1.60

Allis-Chalmers Mfg. Co., Washington, D. C.
HAZARDS ANALYSIS SINGLE BLOWER FAILURE, by D. A. Lampe. 23 Nov 60, rev. 15 Jan 63. 16p
Contract AT(10-1)925

ACNP-61534 OTS $3.60

Allis-Chalmers Mfg. Co., Washington, D. C.
INADVERTENT OPERATION COOLANT LOOP ISOLATION VALVES, HAZARDS ANALYSIS, by A. DeAgazio. 28 Mar 61, 39p 8refs
Contract AT(10-1)925

ACNP-63506 OTS $2.60

Allis-Chalmers Mfg. Co., Washington, D. C. LOSS-OF-PRESSURE ACCIDENT. COLD LEG PIPING FAILURE, by J. Landoni. Apr 60, 26p 4refs
Contract AT(10-1)925

ACNP-61543 OTS $1.60

Allis-Chalmers Mfg. Co., Washington, D. C. LOSS-OF-PRESSURE ACCIDENT. HOT LEG PIPING FAILURE, by A. W. DeAgazio. 11 Jan 62, 11p 3refs
Contract AT(10-1)925

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Allis-Chalmers Mfg. Co., Washington, D. C. REACTOR CORE COOLANT FLOW DISTRIBUTION, by L. H. Devlin. 9 Dec 60, 29p 6refs
Contract AT(10-1)925

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Contract AT(10-1)925.

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Allis-Chalmers Mfg. Co., Washington, D. C. SAFETY AND CONTROL SYSTEM REACTIONS TO TEMPERATURE BARRIER FAILURE, by Ralph P. Marcotte. 5 Jul 61, 25p 2refs
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Contract NAS 5-1253
Rept. no. GA-3523

DESCRIPTORS: *Energy conversion, *Nuclear reactors, *Thermionic converters, *Cathodes, *Uranium compounds, *Zirconium compounds, *Carbides, Tungsten, Molybdenum, Niobium, Tantalum, Vaporization, Diffusion, Emissivity, Resistance (Electrical), Thermal conductivity.

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Geological Survey bulletin 1144-C

DESCRIPTORS: *Strontium, *Cesium, Sorption, *Ores (Non-metallic), *Calcium compounds, *Aluminum compounds, *Phosphates, Hydroxides, Hydrates, *Geochemistry, *Radiactive waste disposal, Radiochemistry.

Study of the interaction of crandallite with dilute cesium and strontium solutions.

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ELEMENTS OF OPTICS AND OPTICAL INSTRUMENTS. Sep 59, 75p 5refs
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DESCRIPTORS: *Optics, *Optical instruments, Instruction manuals, Textbooks

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Technical rept. no. 32-434; NASA CR-50998

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Contract PRO 61-545
Technical note 165; NASA N63-13031

DESCRIPTORS: *Attenuation, Correlation techniques, *Bandwidth, *Ionospheric propagation, High frequency. Radio waves, Measurement.

Measurements of fading correlation bandwidth and of deviations of the instataneous frequency from the average carrier frequency were made on the 4500-km auroral path from Barrow, Alaska, to Boulder, Colorado, at frequencies near 15 and 20 Mc/s. The mean fading correlation bandwidth was found to be 4.3 kc/s. The value exceeded 90% of the time was 1.0 kc/s; the value exceeded 10% of the time was not obtainable. Generally, the bandwidth was smaller during periods of high magnetic activity or high fade rate. It also exhibited a minimum near midday. Cumulative distributions of instantaneous frequency deviations were obtained for a variety of conditions. The distributions generally agreed with a theoretical distribution based on a narrow-band Gaussian noise model if the proper normalizing factor was used. The factor was 1.4 times the measured fade rate. Distributions were also obtained of the percent of time the frequency deviations exceeded certain values for various time durations. Several examples of each type of distribution are presented. (Author)

PB 163 705 OTS $4.60

Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
THEORETICAL STATISTICAL STUDY OF THE SCATTERING OF UNDERWATER SOUND, by Benjamin F. Cron. 20 May 57, 48p 10refs
USL Research rept. no. 352.

DESCRIPTORS: *Underwater sound, *Scattering, Acoustics, Mechanical waves, Propagation, *Statistical analysis, Theory.

A statistical study of the scattering of underwater sound under idealized conditions is made. The scattering objects are considered to be identical and randomly distributed. It is assumed that the scattered energy from each particle is of the same frequency. It is shown that if sine waves of the same frequency traveling in the same direction are superimposed, then the resultant wave is a sine wave of the same frequency. The amplitude and phase of the resultant sine wave may be obtained from the amplitudes and phases of its com-

ponent waves by a vectorial representation. Because of this vectorial representation, the problem of finding the probability distribution of the resultant amplitudes for given distributions of component amplitudes and phases is shown to be the problem of the random walk in two dimensions. The conditions necessary for a Rayleigh distribution of resultant amplitudes are then derived. For a Rayleigh distribution, the variance of the intensity is equal to the square of the mean intensity. An experimental method of verification is thereby provided. A similar study is made of bottom scattering. (Author)

K-1498 OTS $2.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
SCATTERING OF HELIUM AND ARGON FROM THE CLEAVAGE PLANE OF LITHIUM FLUORIDE, by J. C. Crews. 23 Mar 62, 28p 7refs
Contract W7405-eng-26

TID-18231 OTS $2.60

Physics, Engineering, Chemistry Corp., Boulder, Colo.
THE SPECTRUM, THE EXCITATION AND IONIZATION CROSS-SECTIONS FOR PHOTO PROCESSES AND FOR COLLISIONS, OF FIVE TIMES IONIZED OXYGEN. Quarterly rept. no. 7, 1 Dec 62-28 Feb 63, by Carlos M. Varsavsky. 28 Feb 63, 30p 80refs
Contract AT(11-1)1017

MATT-143 OTS $3.60

Plasma Physics Lab., Princeton U., N. J.
ON THE STABILITY OF HYDROMAGNETIC SYSTEMS WITH DISSIPATION, by Bruno Coppi. Jan 63, 38p 12refs
Contract AT(30-1)1238

Electronics

TID-15268 OTS $1.60

Argonne National Lab., Ill.
OPTIMIZATION OF EFFICIENCY OF A CESIUM-DIODE CONVERTER, by C. K. Sanathanan. Jan 62, 11p 1ref
Contract W31-109-eng-38
UAC-5993

Order from GPO $0.40 as D 301.7:101-8A

Department of the Air Force, Washington, D. C.
ELECTRONICS SYSTEMS. FUNDAMENTALS OF ELECTRONICS. 25 Jan 63, 39p
AFM 101-8A; AF 101-8, rev.

DESCRIPTORS: *Electronic equipment, Electronics, Textbooks

Change to Air Force Manual Number 101-8.

UCRL-6731 OTS $1.10

Lawrence Radiation Lab., U. of California, Livermore.
ARE CURL-FREE FIELDS NECESSARY IN GUIDED-WAVE THEORY, by Bernard A. Lippmann. 5 Jan 62, 9p
Contract W7405-eng-48

UCRL-6809 (Rev. 1) OTS $1.60

Lawrence Radiation Lab., U. of California, Livermore.
EMISSION CHARACTERISTICS OF TANTALUM, TUNGSTEN, RHENIUM, AND IRIDIUM IN PLASMA DIODES, by W. H. Gust. 2 Apr 62, 18p
Contract W7405-eng-48

PB 163 709 OTS $12.00

Marine Physical Lab., U. of California, San Diego.
THE HORIZONTAL ELECTRIC DIPOLE IN A CONDUSTING HALF-SPACE, PART II, by Alfredo Baños, Jr. and James Paul Wesley. Aug 54, 164p 48refs Prepared in cooperation with Institute of Geophysics, U. of California
Contract NObsr-43356
SIO Ref-54-31; AD-47 854

DESCRIPTORS: *Dipole antennas, *Antenna radiation patterns, *Electromagnetic fields, Series, Integrals, Dielectric properties, Numerical methods and procedures, Mathematical analysis.

A further account is given of the mathematical theory involved in the determination of the electromagnetic field components generated by a horizontal electric dipole embedded in a conducting half-space separated from the nonconducting medium above by a horizontal plane. A general evaluation is made of the fundamental integrals for both media by the double saddle-point method of integration developed earlier. Asymptotic expansions are obtained that are term-wise differentiable to any order with respect to 3 essential parameters: horizontal range, depth (or height) of dipole source, and height (or depth) of the point of observation. This achievement is a consequence of applying the saddle-point method of integration to a more judicious choice of exponent with the result that the asymptotic expansions are more simple than those previously reported. The expansions are applied to the evaluation of the Cartesian components of the Hertzian vector and of the cylindrical components of the electromagnetic field vectors for observation points in the nonconducting medium.

MATT-151 OTS $2.75

Plasma Physics Lab., Princeton U., N. J.
SOME COMPUTER EXPERIMENTS WITH A ONE-DIMENSIONAL PLASMA MODEL, by Craig Smith and John Dawson. Jan 63, 179p 28refs
Contract AT(30-1)1238.

MATT-180 OTS $2.25

Plasma Physics Lab., Princeton U., N. J.
THEORY OF SPHERICAL ELECTROSTATIC PROBES IN A SLIGHTLY IONIZED, COLLISION-DOMINATED GAS, REVIEW AND EXTENSION, by Ira M. Cohen. Mar 63, 111p 44refs
Contract AT(30-1)1238.

MATT-168 OTS $2.60

Princeton U., N. J.
CESIUM PLASMA EXPERIMENTS, by Nathan Rynn. Dec 62, 29p 5refs
Contract AT(30-1)1238

TID-18439 OTS $3.60

Stevens Inst. of Tech., Hoboken, N. J.
RAIL GUN STUDIES, MARCH-1 SEPTEMBER, 1959, by Winston H. Bostick. 39p
Contract AT(30-1)1921

Solid State Physics

TID-18432 OTS $12.50

California Inst. of Tech., Pasadena.
NEUTRON THERMALIZATION IN SOLIDS, by Kaye Don Lathrop. Jun 62, 171p 51refs

TID-18253 OTS $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
RADIATION EFFECTS IN SOLIDS. Progress rept. 1 Apr 62-31 Mar 63, by D. A. Wiegand. 8 Feb 63, 23p 38refs
Contract (30-1)3033

PB 163 720 OTS $5.60

David Sarnoff Research Center, Princeton, N. J.
HIGH TEMPERATURE SEMICONDUCTOR RESEARCH. Final rept., 1 Oct 59-30 Sep 62, by L. R. Weisberg. 31 Oct 62, 53p 46refs
Contract AF 19(604)6152, FR
AFCRL-62-944; NASA N63-13210

DESCRIPTORS: *Semiconductors, High temperature research, *Gallium compounds, *Phosphides, *Arsenides, Alloys, Purification, Preparation, *Crystal lattice defects, Impurities, *Crystal growth, Electric insulation, *Thermoelectricity.

The research was mainly materials-oriented rather than device-oriented. Of this work, roughly 70% was performed on GaAs, 20% on GaP, and 10% on GaAs-GaP alloys. This research has added greatly to the general fund of knowledge concerning these materials and, in particular, has provided four contributions: discovery and explanation of the existence of large concentrations of lattice defects in GaAs; understanding and controlled preparation of high resistivity (semi-insulating) GaAs; delineation of the introduction and behavior of impurities in GaAs; significant progres toward the preparation of large single crystals of GaP. The last section of this report is a full description of the research on lattice defects in GaAs.

KAPL-2226 OTS $3.60

Knolls Atomic Power Lab., Schenectady, N. Y.
ANNEALING OF NEUTRON RADIATION DAMAGE IN p-TYPE PbTe, by J. C. Corelli and D. M. Amorosi Jan 62, 36p 7refs
Contract W31-109-eng-52

Order from GPO $0.25 as C 13.46:174

National Bureau of Standards, Washington, D. C.
RESEARCH ON CRYSTAL GROWTH AND DEFECT CHARACTERIZATION AT THE NATIONAL BUREAU OF STANDARDS DURING THE PERIOD JULY TO DECEMBER 1962, ed. by H. Steffen Peiser. 15 Mar 63, 34p 22refs
Technical note 174

DESCRIPTORS: *Crystal growth, *Crystal lattice defects, Phase studies, Spectroscopy, Semiconductors, Scientific research

This work will provide theory on the mechanism of crystal growth, experimental techniques for growth and study of crystals, interpretive analysis of observations on crystals examined by diverse methods, and data from the measurement of defect-sensitive properties of crystals. This note describes principally the individual NBS research activities during July to December 1962 coupled with statements on the most immediate plans at the end of that period. An introductory section is followed by two other brief general sections describing the program area and the NBS background interest in the field of crystal growth and characterization.

TID-18433 OTS $1.60

W. M. Keck Lab. of Engineering Materials, Calif Inst. of Tech., Pasadena.
SOLID SOLUTIONS IN COOPER-IRON ALLOYS, Technical rept. no. 13, by William Klement, Jr. Mar 63, 16p 23refs
Contracts AT(04-3)221 and Nonr-220(30).
23refs

Thermodynamics

WAPD-T-1566 OTS $2.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
VISUAL STUDY OF BOILING WATER AT HIGH PRESSURE, by E. R. Hosler. Jan 63, 24p 14refs
Contract AT(11-1)GEN-14

LADC-5631 OTS $4.60

Los Alamos Scientific Lab., N. Mex.
MATHEMATICAL AND EXPERIMENTAL ANALYSIS OF TEMPERATURE DISTRIBUTIONS IN STORED IRRADIATED LAMPRE CAPSULES. AN ITERATIVE EQUATION GENERATION PROCEDURE, by John C. Biery and Robert N. Kennedy. 1961, 46p 12refs
Contract W7405-eng-36

PB 163 794 OTS $4.60

Missouri U. [Columbia].
STUDIES OF THE THERMAL ACCOMMODATION COEFFICIENTS OF GASES ON METAL SURFACES AND THEIR RELATION TO THE ADSORBED CONDITION OF THE SURFACES. Final rept. on Determination of the Thermal Accommodation Coefficient and

Research on the Conduction of Heat by Dilute Gases from Solid Surfaces and its Use as an Indicator to Surface Condition, by Lloyd B. Thomas. [1958] 44p
Contracts DA 23-072-ORD-388 and DA 23-072-ORD-990
AD-204 684

DESCRIPTORS: *Thermodynamics, Metals, *Tungsten, *Beryllium, *Alkali metals, *Glass, Surface properties, Gases, *Helium, *Neon, *Argon, *Krypton, Xenon, Adsorption, Thin films, *Electron tubes.

Contents:
Comparison of the two principal methods of determining accommodation coefficients
The accommodation coefficient of He on clean tungsten from 83° to 303°K
The accommodation coefficients of the inert gases He, Ne, A, Kr, and Xe on bare tungsten from 78° to 303°K
The accommodation coefficients of He and Ne on beryllium and test of the classical theory of Baule
Quantum mechanical theory of the accommodation coefficient and the clean surface values
Accommodation coefficient studies on alkali metal surfaces
Studies of the thermal accommodation coefficients of gases on adsorbed films on tungsten
End loss correction of A. C. values; A. C. determination on a glass sphere; method for improving accuracy of the McLeod gauge; method for studying physical adsorption.

NBS-7677 OTS $1.10

National Bureau of Standards, Boulder Colo.
THE CRYOGENIC ASPECTS OF PROJECT SHERWOOD. Progress rept. no. 13, 31 Dec 62-31 Mar 63. 31 Mar 63, 5p

NASA N63-11544 OTS $3.60

National Bureau of Standards, Boulder, Colo.
CRYOGENIC RESEARCH AND DEVELOPMENT. Progress rept. no. 7 for period ending 30 Sep 62, by R. J. Corruccini. 30 Sep 62, 40p.
Report no. 7607

ORNL-TM-481 OTS $2.60

Oak Ridge National Lab., Tenn.
INFLUENCE OF CO- CO_2 ENVIRONMENTS OF THE CALIBRATION OF CHROMEL-P-ALUMEL THERMOCOUPLES, by H. E. McCoy, Jr. 28 Mar 63, 22p 3refs
Contract W7405-eng-26

SCTM-21-63(24) OTS $1.10

Sandia Corp., Albuquerque, N. Mex.
AN AIR-BATH COMPARATOR FOR LIQUID-IN-GLASS THERMOMETERS, by R. B. Foster, Jr. Feb 63, 9p
Contract AT(29-1)789

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

Order from GPO $3.50 as
NS 12:F 31/962

National Science Foundation, Washington, D. C.
FEDERAL ORGANIZATION FOR SCIENTIFIC ACTIVITIES, 1962. Aug 62, 606p
NSF 62-37; NSF 56-17, rev.; NSF 57-13, rev.

DESCRIPTORS: *Scientific organizations, *United States Government, *Scientific information centers, Job analysis, Armed Forces (United States), Scientific research.

This report which delineates the organization of the Federal Government for scientific activities complements the monetary and manpower investigations. In addition to being a reference work, it provides an indication of the direction in which the Federal organization for scientific activities has been moving. It represents a companion volume to another National Science Foundation publication concerned with the Federal sector of the economy. The annual Federal Funds for Science reflects financial trends in the Federal organization for science and technology, whereas Federal Organization for Scientific Activities, 1962 reflects organizational changes and trends.

SOCIAL SCIENCES

PB 163 475 OTS $1.60

Pennsylvania U. [Philadelphia].
IMMEDIATE-CONSTITUENT FORMULATION OF ENGLISH SYNTAX. Rept. no. 45 on Transformations and Discourse Analysis Projects, by Zellig S. Harris. Apr 63, 15p

DESCRIPTORS: *English language, Language, *Syntax, Analysis

English syntax is presented here in terms of immediate constituents, the classical method of descriptive linguistics first made explicit in Bloomfield's Language. The formulation here is such as to facilitate comparisor with a string-analysis of English syntax (where the differences are small) and with transformational analysis (where the differences are large).

Documentation

PB 163 758 OTS $1.60

Engineers Joint Council, New York.
STUDY OF ENGINEERING TERMINOLOGY AND RELATIONSHIPS AMONG ENGINEERING TERMS. Final rept. Jul 62-Aug 63, by Eugene Wall. Aug 63, 19p 4refs
NSF Grant G 24836

DESCRIPTORS: *Information retrieval, *Subject indexing, *Engineering, Documentation

The objectives were to determine (within the engineering profession) the extent of common terminology, the degree of ambiguity of term meanings, and to evaluate the possibility of creating a unified vocabulary useful in the origination, storage, retrieval and dissemination of engineering information. A 1000 term sample of this proposed vocabulary was analyzed and from the results of the analysis, the following conclusions are drawn: (1) the investigational procedures used during the study were appropriate; (2) overlap of term usage within the engineering profession is significant (74%); (3) ambiguities in term meanings within the engineering profession are fairly frequent (8%), but are easily resolved; (4) most terms of any major degree of interest to even one portion of the engineering profession have been detected and considered; (5) it is feasible to provide a unified vocabulary for use by the entire engineering profession.

Order from GPO $3.25 as
LC 2.8:Sci2

Reference Dept., Library of Congress, Washington, D. C.
INTERNATIONAL SCIENTIFIC ORGANIZATIONS. A GUIDE TO THEIR LIBRARY, DOCUMENTATION, AND INFORMATION SERVICES, by Kathrine O. Murra.
Feb 62, 802p
Rept. no. LC 62-64648

DESCRIPTORS: *Scientific information centers, *Scientific organizations, *Indexes, *Bibliographies, *Libraries, Documentation

Contents:
International scientific organizations
Bibliography of general sources of information
Key to location symbols
List of acronyms

PB-181 419 OTS $1.25, $10./year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Nov 63

DESCRIPTORS: *Naval research, *Scientific research, *Spectrum analyzers, *Fracture (Mechanics), *Atmosphere, Fission products, *Chemistry, Vanadium compounds, Fuel oils, *Mechanics, Adhesives, *Metallurgy, *Ceramic materials, Fatigue (Mechanics), Ferromagnetic materials, Metallic coatings, Steel, Pressure vessels, *Nuclear physics, Crystals, *Radio, Radio transmitters, Radio transmission, Band-pass filters, *Solid state physics, Color centers, Ultraviolet radiation, *Acoustics, Transducers (Acoustic), Shielding, Reports, Patents.

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Direct-Reading Derivative Spectrometer, by D. L. Mitchell
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Solid State Physics: Absorption band shapes for the F-center and Thallim in KCl. Persistent enhanced ultraviolet radiation from double-pulsed flash lamps
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U.S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field Offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data with national and often State and regional breakdowns, on manufacturing wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

Department Field Offices

Albuquerque, N. Mex., 87101, U. S. Courthouse. 247-0311.
Anchorage, Alaska, 99501, Room 60, U.S. Post Office and Courthouse. Phone: BR 2-9611.
Atlanta, Ga., 30303, 75 Forsyth St., N.W. JAckson 2-4121.
Birmingham, Ala., 35203, Title Bldg., 2028 Third Ave., North. Phone: 323-8011.
Boston, Mass., 02110, Room 230, 80 Federal Street. CApitol 3-2312.
Buffalo, N.Y., 14203, 504 Federal Building, 117 Ellicott St., TL 3-4216.
Charleston, S. C., 29401, Suite 201, Marcus Building, 6 Broad Street. Phone: 722-6551.
Cheyenne, Wyo., 82001, 207 Majestic Bldg., 16th & Capitol Ave. Phone: 634-2731.
Chicago, Ill., 60606, Room 1302, 226 West Jackson Blvd. 828-4400.
Cincinnati, Ohio, 45202, 809 Fifth Third Bank Bldg., 36 E. Fourth Street. 381-2200.
Cleveland, Ohio, 44101, 4th Floor, Federal Reserve Bank Bldg., East 6th St. & Superior Ave. 241-7900.
Dallas, Tex., 75201, Room 3-104, Merchandise Mart, 500 South Ervay Street. RIverside 8-5611.
Denver, Colo., 80202, 142 New Custom House, 19th & Stout Street. 534-4151.
Detroit, Mich., 48226, 438 Federal Bldg. 226-6088.
Greensboro, N. C., 27402, Room 407, U.S. Post Office Bldg. 273-8234.
Hartford, Conn., 06103, 18 Asylum St. Phone: 244-3530.
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Jacksonville, Fla., 32202, 512 Greenleaf Building, 204 Laura Street. ELgin 4-7111.
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Los Angeles, Calif., 90015, Room 450, Western Pacific Bldg., 1031 S. Broadway. 688-2830.
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Miami, Fla., 33132, 408 Ainsley Bldg., 14 N. E. First Ave. FRanklin 7-2581.
Milwaukee, Wis., 53203, Straus Bldg., 238 W. Wisconsin Ave. Phone: BR 2-8600.
Minneapolis, Minn., 55401, Room 304, Federal Bldg., 110 South Fourth Street. Phone: 334-2133.
New Orleans, La., 70130, 1508 Masonic Temple Bldg., 333 St. Charles Avenue. Phone: 529-2411.
New York, N. Y., 10001, 61st Fl., Empire State Bldg., 350 Fifth Ave. LOngacre 3-3377.
Philadelphia, Pa., 19107, Jefferson Building, 1015 Chestnut Street. WAlnut 3-2400.
Phoenix, Ariz., 85025, New Federal Bldg., 230 N. First Avenue. Phone: 261-3285.
Pittsburgh, Pa., 15222, 1030 Park Bldg., 355 Fifth Avenue. 471-0800.
Portland, Oreg., 97204, 217 Old U. S. Courthouse, 520 S. W. Morrison Street. 226-3361.
Reno, Nev., 89502, 1479 Wells Avenue. Phone: FA 2-7133.
Richmond, Va., 23240, 2105 Federal Building, 400 North 8th Street. Phone: 649-3611.
St. Louis, Mo., 63103, 2511 New Federal Building, 1520 Market Street. MAin 1-8100.
Salt Lake City, Utah, 84101, 222 S. W. Temple St. DAvis 8-2911.
San Francisco, Calif., 94011, Room 419, Customhouse, 555 Battery St. YUkon 6-3111.
Santurce, Puerto Rico, 00907, Room 628, 605 Condado Ave. Phone: 723-4640.
Savannah, Ga., 31402, 235 U. S. Courthouse and Post Office Bldg., 125-29 Bull Street. ADams 2-4755.
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